ENVIRONMENTAL ASSESSMENT

MAINTAINING VIABLE POPULATIONS OF WILD HORSES ON HEALTHY RANGELANDS IN HMAS IN THE RAWLINS FIELD OFFICE JURISDICTION

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I. PURPOSE AND NEED
- **A. PURPOSE**
- **B. NEED**
- **TABLE**
- **C. CONFORMANCE WITH LAND USE PLAN**
- **D. RELATIONSHIP TO OTHER STATUTES, REGULATIONS, OR OTHER PLANS**
- **E. POLICY**

II. ALTERNATIVES ANALYZED AND A DESCRIPTION OF EACH ALTERNATIVE
- **ASSUMPTIONS COMMON TO MORE THAN ONE ALTERNATIVE**
- **ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL**

III.AFFECTED ENVIRONMENT
- **A. INTRODUCTION**
- **MAP 1**
- **B. WIDLIFE**
  - **1. NONTHREATENED SPECIES**
  - **2. THREATENED AND ENDANGERED SPECIES (T & E SPECIES)**
- **C. CULTURAL, HISTORIC RESOURCES**
- **D. WILD HORSES**
- **E. DOMESTIC LIVESTOCK**
- **F. VEGETATION AND SOILS**
- **G. RECREATION**
- **H. WILDERNESS**
- **I. RIPARIAN AREAS**
- **J. PRIVATELY-OWNED AND CONTROLLED LANDS**
- **K. SOCIO ECONOMICS**

IV.ENVIRONMENTAL CONSEQUENCES
- **A. INTRODUCTION**
- **B. WIDLIFE**
  - **1. NONTHREATENED SPECIES**
  - **2. THREATENED AND ENDANGERED SPECIES (T & E SPECIES)**
- **C. CULTURAL, HISTORIC RESOURCES**
- **D. WILD HORSES**
- **E. DOMESTIC LIVESTOCK**
- **F. VEGETATION AND SOILS**
- **G. RECREATION**
- **H. WILDERNESS**
- **I RIPARIAN AREAS**
- **J. PRIVATELY-OWNED AND CONTROLLED LANDS**
- **K. SOCIO ECONOMICS**

V. MITIGATIVE MEASURES

VI. RESIDUAL IMPACTS

VII. CUMULATIVE IMPACTS

VIII. CONSULTATION AND COORDINATION
- **A. INTRODUCTION**
- **B. DISTRIBUTION**
- **C. LIST OF PREPARERS**
- **D. REFERENCES**

APPENDIX A
POPULATION MANAGEMENT CONSIDERATIONS/AN ANALYSIS OF ALTERNATIVE MANAGEMENT
Background

Introduction
Analysis considerations
Areas of Analysis
Selective Removal
Fertility Control
Assumptions

COMPARISON OF ALTERNATIVE POPULATION MANAGEMENT STRATEGIES
Baseline
Selective Removal strategies
Fertility Control Strategies
CONCLUSIONS

APPENDIX B
SPRING ROUNDUPS IN WYOMING (February 15 to April 15)
CURRENT PRACTICE
HISTORY OF CURRENT PRACTICE
CURRENT PRACTICE VIS A VIS PREGNANT MARES AND VERY YOUNG FOALS
CURRENT VS FUTURE CONDITIONS
ANALYSIS OF CURRENT PRACTICE
FOALING DATA
Field Studies
WHBIS Data
MARE DATA
RELATIONSHIP OF FOALING ACTIVITY TO OTHER FACTORS
SUMMARY AND CONCLUSIONS
DATA SOURCE
METHOD OF ANALYSIS
CONCLUSIONS OF ANALYSIS
POLICY CONSIDERATIONS
Veterinary Opinions
1999 ADDENDUM

I. PURPOSE AND NEED FOR MANAGEMENT OF WILD HORSES

A. PURPOSE

The purpose of management of wild, free roaming horses is to comply with law and policy pertaining to wild, free roaming horses on public lands. BLM policy addresses a range of topics including and maintenance of Appropriate Management Levels (AMLs) in Herd Management Areas (HMAs) within the jurisdiction of the Rawlins Field Office (RFO) in a humane, safe, efficient, and environmentally sound manner. It is outlined in the Rawlins Field Office Wild Horse Management Handbook (the handbook) which incorporates all of the relevant state and national policy and direction pertaining to wild horse management on the public lands.

B. NEED

The need for management of wild, free roaming horses is to maintain a thriving natural ecological balance and to preserve the multiple use relationship that exists in the areas affected by wild horses. This, in turn creates the need to establish a framework that will enable the BLM to attain and maintain AMLs within 3 HMAs in the jurisdiction of the RFO and to prevent the establishment of wild horse herds outside of the designated HMAs. As numbers within HMAs rise above certain levels, competition for critical habitat requirements increases and leads to instances where the horses move outside the boundaries of the HMAs. Section 4 of the Act states: "if wild and free roaming horses or burros stray from public lands onto privately owned land, the owners of such land may inform the nearest Federal marshall or agent of the Secretary, who shall arrange to have the animals removed." Such actions must be conducted in compliance with the same laws that govern planned actions. The procedures described in the capture plan (Appendix B of the the handbook) may also be used to gather and remove wild horses from private lands anywhere within the RFO at the request of the landowner.

The following table depicts the areas included in this analysis.

AREA	PUBLIC ACRES	OTHER ACRES	AML	ESTIMATED POPULATION (1999)
ADOBE TOWN HMA	441,000	29,000	700	900
STEWART CREEK HMA	155,000	11,000	150	350
LOST CREEK HMA	235,000	15,000	70	300
I 80 S*	359,000	195,000	0	20
I 80 N**	333,000	356,000	0	210
BAIROIL***	6,000	1,000	0	
TOTAL	1,529,000	607,000	920	1780

* All lands south of interstate 80 and west of Wyoming Hwy 789 with the exception of the Adobe Town HMA.
** All lands north of interstate 80 and west of Wyoming 789 with the exception of the Stewart Creek and Lost Creek HMAs, a portion of the Antelope Hills/Cyclone Rim HMA, and the Bairoil Pasture in the Ferris In-common allotment.
*** All lands within the Bairoil Pasture of the Ferris In-common Allotment.

Management is also needed to maintain the health of the public rangelands the horses and other animals depend on and to ensure that BLM activities are in conformance with 43 CFR 4180. It also enables BLM to maintain horse populations at levels that will prevent unwanted damage to State and privately owned lands that occur within and adjacent to the HMAs.

Management is also indicated to maintain the credibility of Rawlins BLM as a good neighbor and an example of a responsible user of the public rangeland resource.

A predictable supply of healthy, adoptable horses is needed to maintain interest in the Adopt-a-horse Program while it continues to be the only available means for disposition of excess horses that must be removed from the range.

C. CONFORMANCE WITH LAND USE PLAN

The action is in conformance with the Great Divide Resource Management Plan (November 1990) which established the following objective for wild horse management in the Rawlins Field Office jurisdiction:

To protect, maintain, and control a viable, healthy herd of wild horses while retaining their free-roaming nature and to provide adequate habitat for free-roaming wild horses through management consistent with environmental protection and enhancement policies.

D. RELATIONSHIP TO OTHER STATUTES, REGULATIONS, OR OTHER PLANS

No other federal, state, or local plans will be affected by managing wild horses, and no other permits or authorizing actions are required. The action will be implemented under the authority of the Wild, Free-Roaming Horse and Burro Act of 1971 (the Act) and 43 Code of Federal Regulations (CFR) 4700. The processing and transport of wild horses will be conducted in conformance with all applicable state statutes.

All federal actions must be reviewed to determine their probable effect on threatened and endangered plants and animals. This process is termed Section 7 consultation (Section 7 of the Endangered Species Act). The process is described in detail in the handbook.

Federal actions must also be reviewed to determine their probable effect on cultural and historic properties. This process is termed section 106 consultation (Section 106 of the Historic Preservation Act). The process is

described in detail in the handbook.

43 CFR 4180 requires that all BLM management actions achieve or maintain healthy rangelands.

A specific Habitat Management Area Plan (HMAP) guides the ongoing management of the horses in a specific herd. The HMAP contains objectives for both the horses and their habitat along with proposed management actions that will achieve those objectives.

When the indicated management action is a Population Management Action (PMA) (usually gather and removal), an individual gather plan is prepared to guide that action to insure effective operation and humane treatment of the animals involved.

E. POLICY

One of BLM's objectives (43 CFR 4700.0-2) regarding wild horse management is to manage wild horses "as an integral part of the natural system of the public lands under the principle of multiple use."

"Management of wild horses shall be undertaken with the objective of limiting the animals' distribution to the herd areas at AMLs. Wild horses and burros shall be removed from private land when the landowner submits a written request to BLM for their removal" (43 CFR 4720.2-1).

Wild horse management focuses on providing habitat for the wild horses within HMAs and on maintaining the populations within AMLs.

The the handbook contains a compilation of the current policies directing wild horse management within the Field Office.

II. ALTERNATIVES ANALYZED AND A DESCRIPTION OF EACH ALTERNATIVE

Prior to the completion of the analysis presented in Section IV of this document, a preliminary analysis was conducted for all alternatives to help quantify them in common terms. This preliminary analysis was limited to population demographics. This analysis utilized the population model developed for BLM by Dr Stephen Jenkins. The analysis consisted of a series of nine trials each for a period of 30 years in order to establish the most likely effect that the alternative management strategies would have on the population demographics of the wild horses and therefore on the identification and quantification of the environmental consequences associated with that particular alternative. In all of these analyses, the selected management strategy was employed continuously throughout the trial period and not adjusted on a year-to-year basis.

ALTERNATIVE 1 - EMPLOY THE PRACTICES AND METHODS DESCRIBED IN THE RAWLINS FIELD OFFICE WILD HORSE MANAGEMENT HANDBOOK TO ACHIEVE AND MAINTAIN AMLs IN

THE RAWLINS FIELD OFFICE AND FOR OTHER PURPOSES AUTHORIZED UNDER THE ACT; SELECTING THE APPROPRIATE PRACTICES AND MITIGATING MEASURES ON A CASE BY CASE BASIS.

Under this alternative, the practices described in the handbook would be employed in a program of regular, scheduled individual PMAs that would be carried out in accordance with three distinct HMAPs developed for the three HMAs. All three HMAs have existing HMAPs in place that have not recently been reviewed or revised. Those HMAPS would be reviewed and revised in accordance with the handbook within the short term. In addition to PMAs, the HMAPs would direct other management actions within the HMAs which would include monitoring and timely response to emergency conditions and ensure humane care and treatment of the horses. The individual PMAs would be planned on a herd by herd, year by year basis. The purpose of the PMAs would be to achieve and maintain the AMLs established by other processes outlined in the HMAPs. For the purpose of analysis, AML would be attained in the year 2002 and maintained thereafter by the annual removal of an average of 200 horses, ages five and under. Attaining AML would require the removal of 600 horses each during the years 2000, 2001, and 2002. In order to remove 600 horses, approximately 1000 horses would be gathered. For the purpose of analysis, selective removal criteria employed were 100% of horses five and under and 25% of horses six-nine years of age removed. Under this scenario, mean population size did not reach the lower limit of AML within the thirty year period, however it was stable at approximately the upper limit of AML after five years and remained within an acceptable range of 750-1350 > 95% of the time. In order to implement this strategy, the probable number of gathers required would be 15, the probable number gathered 7942 and the probable number removed 5481.

ALTERNATIVE 2: DO NOT ACHIEVE OR MAINTAIN AMLs IN THE HMAS IN THE RAWLINS FIELD OFFICE. EMPLOY THE PRACTICES AND METHODS DESCRIBED IN THE RAWLINS FIELD OFFICE WILD HORSE MANAGEMENT HANDBOOK ONLY UNDER EMERGENCY CONDITIONS OR IN RESPONSE TO LANDOWNER REQUESTS.

Under this alternative, the practices described in the handbook would be employed whenever an emergency was determined to exist or whenever a request to remove wild, free roaming horses from private lands was received. There would be no regular, scheduled individual PMAs. The existing HMAPs would not be reviewed or revised. For the purpose of analysis, emergency situations and landowner requests would gradually increase until they reached a level of approximately 600 adoptable horses per year. Due to the nature of the actions that would be undertaken, some of the horses that would be placed in the adoption program would be 6-9 years old and be candidates for special handling. This could be understood to be no action, except for in specific instances as provided by law. As this alternative is primarily reactive, in nature, it does not lend itself to the finite kind of quantification possible with alternative # 1.

ALTERNATIVE 3: RELY ON PREDATION AND ENVIRONMENTAL FORCES TO ESTABLISH AND MAINTAIN SELF-REGULATING POPULATIONS

Under this alternative, no gathering would take place. Herds would be allowed to increase until they reached levels where predation and environmental factors coupled with density-dependant adjustments in reproductive rates stabilized the populations. This would consist primarily

of environmental factors as currently, mountain lions are the only predators existing in the area known to be able to effectively take wild horses. Within the existing HMAs, there is little area that is suitable habitat for mountain lions and they would not be expected to increase in numbers sufficiently to control wild horse populations. Neither grizzly bears nor wolves could be expected to expand their season long ranges into areas that would be occupied by horses. Mountain lion (as well as the other potential predators discussed below) management is the responsibility of the Wyoming Game and Fish Department (WGFD). The WGFD shares some of this responsibility with USDA Animal and Plant Health and Inspection Service, Wildlife Services (APHIS). Grizzly bears might encounter a few horses as the horses were at the extremes of their summer ranges in some of the HMAs. Wolves might increase their range to take advantage of seasonal concentrations of horses under stressed conditions, but in order to do so, they would first encounter wildlife and domestic livestock in nearby areas and be subject to control by other agencies. Coyotes are common where the horses range but only take an occasional very young or weak horse under unusual circumstances. The introduction of other large predators is neither legal nor practical.

The environmental forces that would operate under this scenario would consist of two types. The first would be adverse weather such as prolonged drought resulting in diminished drinking water or harsh winter conditions resulting in a temporary forage deficit; the second would be reduced ability of the habitat to support the basic physiological needs of the horses on a continuing basis. The two types would interact to maximize or minimize the effects of either. For example, if a harsh winter occurred at the same time as a population peak and related habitat decline, there would be more horses in a vulnerable state and starvation-related deaths would be higher than if the same winter conditions were encountered when the population had not yet recovered from some prior event. There would be a somewhat linear correlation between population and habitat quality. As populations increased, habitat quality would decline. When populations declined dramatically, there would be some opportunity for habitat recovery until the populations recovered. Under this alternative, there would be no response to emergency conditions nor to landowner requests. The time periods and populations would vary amongst the HMAs. The analysis parameters are derived from actual calculations for the Adobe Town HMA. For the purpose of analysis, populations in the Adobe Town HMA would increase geometrically for 12 years, stabilizing at approximately 5,300 in the year 2012. Thereafter, populations would probably fluctuate within the range of 2,500 to 7,500 as the cycle of increase/die-off occurred. Over time, the maximum number that would trigger die-off would decrease as the health of the habitat and its ability to support horses declined. Similar projections are more speculative for the Lost Creek and Stewart Creek HMAs as most of the available water sources are on privately-owned or controlled lands and thus not likely to remain available long enough to allow a cycle of self-regulation to become established. This could be understood as no action at all on the part of BLM and therefore illegal. However, the concept of self-regulating populations demands analysis and this alternative provides the opportunity to see that apart from other actions.

ALTERNATIVE 4: ACHIEVE AND MAINTAIN AMLS IN WYOMING BY THE USE OF FERTILITY

CONTROL ALONE

Pre-analysis determined that fertility control alone would not achieve AML within 30 years. Starting with the existing population and employing fertility control alone would result in a population of 1,253 wild horses after 30 years which would still exceed the AML by approximately 300 wild horses. In the short term the population would continue to increase steadily for about seven years to a level of about 2,200 wild horses and then decline gradually for the next 23 years to reach the 1253 level. This prediction represents the mean of nine trials at the 95% confidence level. The low and high limits within the 95% confidence level were 766 and 1739 horses, respectively. In addition, the model revealed that there was a one-in-nine chance of experiencing a complete die-off within ten years and a one-in-nine chance of experiencing a population size of 3,300 horses within 15 years. During the course of this 30-year period, approximately 39,000 horses would have to be gathered and 16,000 females treated.

If AML was first attained by any method and then fertility control alone was employed to maintain it, the demographic results would be similar, although on a somewhat smaller scale. Beginning with 920 horses and employing fertility control alone for 30 years would result in a population size of approximately 1,100 animals. The population would first increase for six years to about 1,500, then remain stable at about 1,400 for another six years, and then gradually decline to the 1,100 level over the next 18 years. The risks of total die-off or large population increases were both noticeably less when the goal of fertility control was to maintain a population rather than reduce it; however, there was still a one-in-15 chance that either extreme could occur. During this period, about 27,000 horses would need to be gathered in order to treat about 11,000 females.

In either scenario, the average age of the population was steadily increased with time, though all age classes continued to be represented after 30 years. In neither case was sex ratio affected.

In conclusion, fertility control alone would not effectively maintain a wild horse population and its habitat in a healthy and stable state. However, further analysis could well identify a level of fertility control which would be a responsible part of a management strategy for wild horses and their habitat in the Rawlins Field Office jurisdiction.

Under this alternative, wild horses would be gathered in order to administer fertility control agents. The practices described in the handbook would be employed in gathering, transporting, and processing horses. Present, best available technology would be employed. That consists of one IM injection of PZP given to reproductive aged mares. This treatment effectively supresses reproduction in +/- 95% of treated mares for one seven-to-ten month period. However, for the purposes of analysis, it is assumed that the current efforts to develop a vaccine which will effectively prevent two pregnancies will be successful and that such a vaccine would be available for the life of the analysis. Treated and untreated animals would be returned to the range and the suppression of reproduction would become the primary agent for maintaining the populations at the prescribed levels. For the purpose of analysis,

gathering would proceed at the rate of +/- 1,300 horses per year for the purpose of treating an average of 500 reproductive age females per year. Development of acceptable, alternate delivery mechanisms or longer lasting immunocontraception per treatment could materially change the nature and consequences of this alternative. The effects of this suppression of the reproductive rate on genetic viability is not known and so for the purposes of this analysis, it will be assumed that AMLs will not be increased as the age distribution is changed and the reproductive rate suppressed. Further, while the effects of various methods of immunocontraception on individual animals can be predicted in terms of the specific physiological response to the agents administered, the subsequent effect of the presence of varying numbers of treated animals upon the interaction of groups of animals is not known. Thus, the analysis of this alternative is necessarily limited to the probable effects on population demographics that could be predicted assuming no significant changes in the group behavior of the treated population.

ASSUMPTIONS COMMON TO MORE THAN ONE ALTERNATIVE

1. All alternatives assume the same configuration of HMAs and other land management areas.
2. All alternatives assume the same (1999 end-of-year) beginning population levels.
3. Under all alternatives, current BLM policy regarding selective removal would be followed. The specific removal criteria are part of the site specific, individual gather plans and are applied on a herd-by-herd and year-by-year basis. Only age and sex-related criteria are included in the analysis. No other criteria such as color or conformation are included.
4. All alternatives assume the same starting combinations of AML, active grazing preference, wildlife population objectives, and nonconsumptive habitat condition requirements. All assume full use of the active grazing preference and stable wildlife populations at or near the population objectives established for them. All assume that all of these numbers have been properly derived in accordance with the best available technology and current policies regarding their determination and application.
5. Time frames are:
   Immediate-zero to three years hence
   Short term-four to nine years hence
   Long term-ten to twenty-one years hence
6. All alternatives would employ the following mix of services in any PMA. The gather crew would be BLM employees. The helicopter would be privately-owned and under contract to the gather crew on a per hour basis. Saddle horses would be privately owned and leased to BLM. Transportation equipment would be either BLM owned and operated or rented or leased in accordance with procurement procedures. Rented or leased equipment would be under the control and direction of BLM while being utilized in PMAs. Veterinary services would be provided by private, licensed DVMs from the area on a fee for services basis. Veterinary consultation could be provided by APHIS vets on a cost reimbursible basis or by private practitioners on a fee for service basis.
7. All alternatives assume that any action carried out by the BLM will be conducted in accordance with the policies governing that action. This would include standard stipulations and mitigation measures.

ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

CLOSURE OF HMAS TO LIVESTOCK GRAZING
This alternative was not analyzed in detail because its significant features are contained in other alternatives. If livestock grazingas reduced or eliminated in order to increase AMLs, the AMLs would still be determined in a manner which would insure a thriving natural ecological balance and the maintenance of those higher horse populations would have effects essentially the same as Alternative 1. If livestock grazing was eliminated as a precursor to uncontrolled wild horse population increases rather than in response to them, the effects would be essentially the same as Alternatives 2 and 3.

ELIMINATION OF ALL WILD HORSES FROM THE HMAS
This alternative was not analyzed in detail because the land use planning process has affirmed that the public, in general, wishes to see the Act complied with and wishes to have healthy horses on healthy habitats within the area.

INCREASE OR DECREASE AMLS WITHIN THE HMAS
This alternative was not analyzed in detail because the ongoing monitoring of the effects of all uses on the habitat incorporates regular, periodic adjustments of the AML and other authorized uses. This is an inherent feature of Alternative 1. Changing AMLs on this biological basis will have the same effects as described in Alternative 1, while changing AMLs on a political basis would have effects similar to those described in Alternative 3.

III. AFFECTED ENVIRONMENT

A. INTRODUCTION

The area covered by this analysis is within the jurisdiction of the Rawlins Field Office, Wyoming BLM. It is bordered on the south by the Colorado state line, on the east by Wyoming Highway 789, on the north by the Rawlins/Lander Field Office boundary, and on the west by the Rawlins/Rock Springs Field Office boundary. Contained within it are three specific HMAs and three areas that are adjacent to these HMAs and potentially affected by wild horse management within the HMAs (AMLs of 0 below). As shown in the following table, over two million acres of public and private lands are included in this analysis. HMAs occupy 24% of the public lands under the jurisdiction of the RFO. The other three contiguous areas comprise 21% of the public lands under the jurisdiction of the RFO. In all, 45% of the public lands within the jurisdiction of the RFO have the potential to be affected by wild horse management decisions. Map 1 portrays the analysis area.

AREA	PUBLIC ACRES	OTHER ACRES	AML	CURRENT # POPULATION (EOY 1999)
ADOBE TOWN HMA	441,000	29,000	700	900
STEWART CREEK HMA	155,000	11,000	150	350
LOST CREEK HMA	235,000	15,000	70	300
I 80 S*	359,000	195,000	0	20
I 80 N**	333,000	356,000	0	210
BAIROIL***	6,000	1,000	0	5
TOTAL	1,529,000	607,000	920	1785

* All lands south of Interstate 80 and west of Wyoming Hwy 789 with the exception of the Adobe Town HMA.
** All lands north of Interstate 80 and west of Wyoming 789 with the exception of the Stewart Creek and Cyclone Rim HMAs and the Bairoil Pasture in the Ferris In-common allotment.
*** All lands within the Bairoil Pasture of the Ferris In-common allotment.
# These are estimates for Dec 31, 1999, derived from the most current inventories available.

Critical elements of the human environment (USDI-BLM 1988) and their potential to be affected by the Proposed Action and alternatives must be considered. The ten elements listed below are not affected and will not be analyzed or discussed further in this document.

- Air Quality
- Prime and Unique Farmlands
- Wild and Scenic Rivers
- Water Quality, Surface/Ground
- Wastes, Hazardous or Solid
- Floodplains
- Wetlands
- Native American Religious Concerns
- Environmental Justice
- Invasive, non-native species

B. WILDLIFE

NONTHREATENED WILDLIFE SPECIES

Based on observation records from BLM staff, the Wyoming Game and Fish Department (WGFD), and the Wyoming Natural Diversity Data Base (WNDDB), as well as range and habitat preference, there are 60 mammal species that may

occur in the three HMAs. In addition to the most familiar big game species such as mule deer, pronghorn antelope and elk, predator species known to occur or potentially occurring in the area include the coyote, swift fox, red fox, raccoon, ermine, long-tailed weasel, badger, western spotted skunk, mountain lion, and bobcat (Clark and Stromberg, 1987; WGFD, 1992). Lagomorph species include desert cottontail, mountain cottontail, and white-tailed jackrabbit. Pygmy rabbits may occur in the Adobe Town HMA. There are numerous species of squirrels, mice, voles, chipmunks, gophers, shrews, and bats that may occur throughout the HMAs. In addition, white-tailed prairie dogs, beaver, muskrat, bushy-tailed woodrat, and porcupines have the potential to occur in the HMAs (USDI-BLM, 1999).

Based on range and habitat preference, two amphibians and five reptile species are likely to occur within and adjacent to the three HMAs. Amphibian species include the tiger salamander and Great Basin spadefoot, which occur primarily in and adjacent to aquatic habitats. Reptile species include the sagebrush lizard, eastern short-horned lizard, Great Basin gopher snake, wandering garter snake, and prairie rattlesnake (USDI-BLM, 1999; Baxter and Stone, 1998)

Bird species in addition to the sage grouse potentially occurring in the HMAs include the common nighthawk, Say’s phoebe, western kingbird, horned lark, swallows (e.g., violet-green, barn), black-billed magpie, common raven, American crow, rock wren, mountain bluebird, logger-head shrike, Brewer’s sparrow, vesper sparrow, sage sparrow, lark bunting, McCown’s longspur, red-winged blackbird, western meadowlark, Brewer’s blackbird, common grackle, and brown-headed cowbird. In riparian habitats, wading shorebirds that may occur within and adjacent to the HMAs include the great blue heron, snowy egret, black-crowned night heron, American avocet, killdeer, and spotted sandpiper. Waterfowl species that may occur in the area include pie-billed grebe, American coot, Canada goose, mallard, green-winged teal, northern pintail, blue-winged teal, northern shoveler, gadwall, American widgeon, common merganser, and ruddy duck (USDI-BLM, 1999).

Adobe Town HMA

There is both antelope and mule deer crucial winter range located within the Adobe Town HMA. A small but locally important elk population has become established in the southwestern portion of the HMA. There are 16 known sage grouse leks and associated nesting habitat within and adjacent to the HMA; however, there may be more leks in the area that have not yet been identified. In addition, there are numerous raptors that have historically nested, or may nest in the future, in the area which include: kestrels, ferruginous hawks, golden eagles, red-tailed hawks, great-horned owls, prairie falcons, and burrowing owls.

Stewart Creek HMA

There is antelope crucial winter range located in the Stewart Creek HMA. There are 14 known sage grouse leks and associated nesting habitat within and adjacent to the HMA; however, there may be more leks in the area that have not yet been identified. Raptors that may use the area for foraging and/or nesting include northern harriers, ferruginous hawks, golden eagles, red-tailed hawks, and burrowing owls. A small but locally important elk

population utilizes the HMA.

Lost Creek HMA
There is no big game crucial winter range located within the Lost Creek HMA. There are 18 known sage grouse leks and associated nesting habitat within and adjacent to the HMA; however, there may be more leks in the area that have not yet been identified. Raptor species that may use the area for foraging and/or nesting include northern harriers, golden eagles, and ferruginous hawks.

ENDANGERED, THREATENED, AND PROPOSED SPECIES
There are 19 endangered, threatened, proposed and/or candidate wildlife species that may be found, or have the potential to be found, within the RFO area. Informal consultation with the U.S. Fish and Wildlife Service (Service) in Cheyenne, Wyoming concluded that the proposed action to implement wild horse management activities would have no effect on eleven species, and may affect, but is not likely to adversely affect, eight species. The species that the proposed action may affect, but is not likely to adversely affect, include the black-footed ferret, mountain plover, Canada lynx, and swift fox, as well as the four Colorado River species which include the humpback chub, razorback sucker, bonytail chub, and Colorado squawfish.

The black-footed ferret is considered one of the rarest and most endangered mammals in North America and receives full protection under the Endangered Species Act of 1973 (P.L. 93-205). The close association of black-footed ferrets and prairie dogs is well documented. The ferrets rely heavily on prairie dogs for both food and shelter. The original range of the black-footed ferret corresponded closely with the prairie dog, extending over the Great plains area from southern Canada to the west Texas plains, and from east of the 100th Meridian to Utah and Arizona (USDI-BLM, 1984).

The Service proposed listing the mountain plover in February 1999 as a threatened species, without critical habitat, under authority of the Endangered Species Act of 1973 (ESA). The mountain plover is a bird of shortgrass prairie and shrub-steppe landscapes at both breeding and wintering locales (USDI-FWS, 1999b). All three HMAs contain potential habitat for this bird. Nest sites are usually found in areas where the vegetation is less than 10 cm in height, in areas that are 30% bare ground, and rarely near water. The birds often nest in areas that are heavily grazed by livestock and/or prairie dogs.

The swift fox is the smallest prairie-dwelling canid in North America and was found historically in portions of the Great Plains from Canada to Mexico. Homesteading of the prairies during the 1800s likely marked the beginning of the swift fox decline. Additional causes for the decline include destruction of native prairie habitat, intense commercial trapping, and large scale poisonings aimed at wolves. The Wyoming Game and Fish Department (WGFD) completed swift fox surveys in Wyoming in 1995 and concluded that swift fox were found in Laramie, Albany, Converse, Fremont, Goshen, Natrona, Sweetwater, and Weston Counties. The species was found in shortgrass, mixed-grass, sagebrush-grassland, and greasewood-sagebrush habitat types with topography

ranging from flat to badlands-like terrain (Lindzey, et al., 1985). The swift fox has been found near Lost Lake in the Red Desert and may be located within the HMAs.

The Canada lynx is a proposed threatened species and occurs in boreal, sub-boreal, and western montane forests of North America. Snowshoe hares are the primary prey of lynx, comprising 35-97% of their diet throughout the range. Other prey species include red squirrels, ground squirrels, mice, voles, porcupine, beaver, and ungulates as carrion or occasionally as prey. Lynx seem to prefer to move through continuous forests and use ridges, saddles, and riparian areas as travel corridors. In studies in Montana and Wyoming, adult lynx made exploratory movements outside their home range, and lynx have been found to cross large rivers and lakes and have been documented in habitats such as shrub-steppe, juniper, and ponderosa pine (USDI-FWS, 1999a).

The Adobe Town HMA lies within the Colorado River system; however, the Stewart Creek and Lost Creek HMAs drain into the Great Divide Basin and are not located within the Colorado River system. The Colorado River system species include the Colorado squawfish, humpback chub, razorback sucker, and bonytail chub and are described below:.

> The Colorado squawfish was listed as endangered in 1967 and is the largest cyprinid fish (minnow family) native to North America. During pre-development times, this fish may have grown as large as six feet in length, weighed nearly 100 pounds, and may have reached 25-50 years of age. The decline of the fish can be closely correlated with the construction of dams and reservoirs during the 1960s, the introduction of nonnative fish, and the reduction of water flow in the Colorado River system.
>
> The humpback chub was listed as endangered in 1964, inhabits narrow, deep canyon areas, and is relatively restricted in distribution. Although this fish has been regularly found dispersed in the Green and Yampa Rivers, the only major populations of this chub known to exist in the upper Colorado basin are located in Black Rocks and Westwater Canyons of the Colorado River.
>
> Little is known about the biological requirements of the bonytail chub, as the species greatly declined in numbers in the upper basin shortly after 1960. Until recently, the Service considered the species extirpated from the upper basin; however, a specimen which exhibited many bonytail characteristics was collected prior to 1992, possibly indicating that a small extant population exists. Large river reaches in the Colorado River are probably used by this species.
>
> The razorback sucker was listed as endangered in Colorado in 1979. The current distribution and abundance of the razorback suckers have been significantly reduced throughout the Colorado River system. The largest population of razorback suckers in the upper Colorado River basin is found in the upper Green River and lower Yampa River. Specific information on biological and physical requirements of the

razorback sucker is very limited, and habitat requirements for juvenile fish are also unknown (Tyus, 1989, USDI-FWS, 1992).

Implementing wild horse management practices in the RFO would have a no effect on eleven species which include eight fauna: Wyoming toad, western boreal toad, Preble's meadow jumping mouse, bald eagle, and the North Platte River species: least tern, pallid sturgeon, whooping crane, and piping plover and three flora: the Ute's ladies tresses, Colorado butterfly plant, and blowout penstemon. The Service has concluded that these eleven species and associated habitat are not located within or adjacent to the HMAs and, therefore, would not be affected by wild horse management practices in the HMAs. Although the North Platte River species are not located within the Rawlins Field office area, they are included in the RFO T&E species list due to potential impacts to the species from water depletion projects. The eight fauna and three flora species that are analyzed for, and would not be affected by, the wild horse management plan and associated actions include the:

(1) Bald eagle: this species is found in coniferous, cottonwood habitats near large rivers and there are no nests known to occur in the HMAs at this time.

(2) Boreal toad: this species inhabits riparian habitat located in areas above 7,500 feet in elevation adjacent to the Medicine Bow National Forest; this habitat type is not located within the HMAs.

(3) Blowout penstemon: this species is located in sand dunes and disturbed areas south of the Ferris Mountains which are well removed from the HMAs.

(4) Colorado butterfly plant: this species is found in southeastern Wyoming, northcentral Colorado, and extreme western Nebraska; there are no mapped locations of this plant within the HMAs.

(5) Preble's meadow jumping mouse: this species is located within and adjacent to riparian habitats, however, there are no Mouse Protection Areas (MPAs) or Potential Mouse Protection Areas (PMPAs) located within the HMAs. These areas are designated by the U.S. Fish and Wildlife Service (Service). These are riparian areas where the Service has either found a mouse or has identified as being potential habitat for the mouse.

(6) Ute's ladies tresses: this species is found in habitats above 7000 feet in elevation in Albany, Goshen, Niobrara, and Laramie Counties and there are no Category 1, Category 2, or Category 3 locations found within the HMAs.

(7) Wyoming toad: this species' distribution is located within 30 miles of Laramie, Wyoming, specifically Mortenson Lake and the Hutton Lake National Wildlife Refuge; this restricted area is not located within the HMAs.

(8) Whooping crane: this species nests at Wood Buffalo in Canada in the spring and summer and winters in and near the Aransas National Wildlife refuge in Texas; the birds migrate through Nebraska twice a year. During both the spring and fall migrations the birds use the North Platte River and wet meadows to obtain food for survival and reproduction. Streamflow depletions to the North Platte River system may cause impacts to this species; however, these birds are not located within the HMAs.

(9) Least tern: this species nests on sandbars and at sand and gravel pits from the Missouri River to North Platte, Nebraska. These birds nest in areas with less than 20% vegetation. Streamflow depletions to the North Platte River system may cause the destruction and or modification of nests which may impact the birds; however, these birds are not found within the HMAs.

(10) Piping plover: this species nests on sparsely-vegetated sandbars, sand and gravel spoil piles, reservoir shorelines, and alkali wetlands within the North Platte River system. Streamflow depletions to the North Platte River system may contribute to the decrease in the range, distribution, and reproductive success of the plover; however, these birds are not located within the HMAs.

(11) Pallid sturgeon: the range of this species encompasses the Missouri River; the lower reaches of the Platte, Kansas, and Yellowstone Rivers; and the Mississippi River below the confluence with the Missouri River. Streamflow depletions to the North Platte River system may destroy and alter habitat that affects reproduction, growth, and survival of the fish; however, these fish are not located within the HMAs (USDI-FWS, 1996).

C. CULTURAL, HISTORIC RESOURCES

Number of Sites	Eligible Sites	Not Eligible Sites	Unevaluated Sites
2,715	798	931	986

There is a combined total of 2,715 known archaeological sites in all RFO HMAs. Site types include prehistoric open camps, prehistoric lithic scatters, historic period trash associated with the ranching industry, and historic period trail and roads. Cultural resource studies to support wild horse capture will consist of a Class III cultural resource inventory in the area where the horse trap will be located. A report will be written on that inventory and a copy sent to the Wyoming State Historic Preservation Officer. Consultation for each wild horse trap survey will follow the state protocols for the BLM’s National Programmatic Agreement.

D. WILD HORSES

The most likely effects of a particular course of action on wild, free roaming

horses on public lands must be considered in at least three related contexts. These are:

Individual Animals
The local population or herd
The species at large

With respect to those three contexts, wild, free roaming horses in the Rawlins Field Office can be described as follows:

Individual Animals

Within the Rawlins Field Office, there are 1785 (End of 1999 population estimate) horses within or near the three designated HMAs. The handbook contains information regarding color, other physical characteristics and genetic nature of these individuals. The information in the handbook reflects the best current information on horses in the RFO.

Within the three HMAs, the following local populations are identified:

HMA	AML	INDIVIDUAL LOCAL POPULATIONS
Adobe Town	700	Corson Springs Espitalier Spring Greasewood Flats Sand Creek Willow Creek Cedar Breaks Hangout Continental
Stewart Creek	150	Bull Springs Stewart Creek Ferris A&M West Side
Lost Creek	70	Lost Creek
	920	

RFO horses are part of the species at large as represented in the following table

	1971 POPULATION	**AML**	**1999 POPULATION**
BLM-WIDE	17,000	27,000	45,000
WYOMING	<5,000	3153	>5,000
RAWLINS	1,235*	920	1,780

* This number is difficult to develop exactly as administrative boundaries have changed in the intervening years. The 1971 population of the existing

HMAs was 635.

RFO METAPOPULATIONS

Background

Individual herds of wild, free roaming horses are identified and managed as required by law and BLM policy. That process of identification involves the designation of specific areas of land (HMAs) for the use of specific populations of horses. The XYZ HMA may be completely surrounded by other HMAs with other populations of horses or it may be completely isolated from any others. In the latter case, the XYZ HMA contains the entire gene pool for that population. In the former, the gene pool for the XYZ HMA consists of the genes of all the horses that would have sufficient contact with one another to exchange breeding age individuals on any regular basis. Recent studies have determined that the amount of interchange that is required to maintain genetic diversity is not as great as has been thought. The metapopulation is the entire gene pool available to the specific herd in question. For instance, the XYZ HMA adjoins the ABC HMA. The XYZ herd and the ABC herd are widely separated in the spring, summer, and fall. But every winter they bump into each other for a period of time. During that period of time, a few youngsters from ABC switch allegiance and join XYZ, and vice versa. By this mechanism, each population is periodically infused with different genes and the genetic diversity of both herds is enhanced. In any given year, only a very few bands from each herd may actually exchange members but over time, the normal behaviors of each herd will cause that mixing to become widespread in its expression. XYZ and ABC are both part of one metapopulation and the effective size of either is increased from the perspective of genetic diversity and population viability. The bands maintain their customary home ranges and preserve their individual identities as residents of one HMA or another but the individual membership changes.

These considerations are important in the Rawlins Field Office because the AML for two of the three herds occurring within the area is 150 or less. 150 has been identified as the population level below which problems with genetic viability may be encountered.

From the standpoint of genetic viability, the required level of exchange of animals and the related introduction of new genetic material is not high. In small populations of less than 150 animals, the introduction of one or two competent breeding animals per generation (~10 years) will insure the maintenance of the genetic resource. Thus, to be members of the same metapopulation, individual animals need not experience frequent, large scale contact with one another.

Rawlins Field Office Metapopulations

The table below identifies each HMA and its respective metapopulation and the primary points and types of interaction. Wild horses in the RFO belong to one of two metapopulations. Both are well above the population size (150) that could result in genetic concerns.

TABLE 4

HMA		METAPOPULATION		HMA(S) IN THE METAPOPULATION	TYPE of INTERACTION	POINTS OF CONTACT
NAME	AML	NAME	AML			
ADOBE TOWN	700	STATELINE	1250	ADOBE TOWN SALT WELLS SAND WASH (co)	Male migration, female exchange	Haystacks, Alkali, Sand Creek Powder Wash
STEWART CR	150	RED DESERT	950	STEWART CR GREEN MT CROOKS MT LOST CREEK ANTELOPE HILLS DIVIDE BASIN	Male migration, female exchange	Hay Res, Bare ring, Hadsell, Osborne Draw
LOST CREEK	70	RED DESERT	950	STEWART CR GREEN MT CROOKS MT LOST CREEK ANTELOPE HILLS DIVIDE BASIN	Male migration, female exchange	Hay Res, Bare ring, Hadsell, Osborne Draw

E. DOMESTIC LIVESTOCK

Domestic livestock are authorized to use the public lands under the authority of the Taylor Grazing Act as amended. Livestock belonging to specific livestock operators are authorized to use specific areas of rangeland (grazing allotments) for specified periods of time in specified numbers. Eighteen of the 588 grazing allotments in the Rawlins Field Office jurisdiction occur within HMAs. In all cases, the grazing allotment and the authorization of livestock use predate passage of the Act.

The rangelands in the HMAs provide seasonal grazing for livestock (cattle and sheep). Wherever domestic livestock are authorized to use the public lands, range improvements are present. These range improvements are operated and maintained by the livestock operators and they all affect wild horses. Fencing is primarily used to keep livestock in proper allotments during specified seasons of use. Livestock water is provided by springs, wells, intermittent and ephemeral streams, pipelines and reservoirs. Sheep use snow in the winter as a water source. Sheep grazing in the HMAs is all within the winter period. Cattle grazing is about evenly distributed amongst the seasons. The overall decline in the range sheep industry has resulted in a low and variable rate of actual use by sheep operators. Cattle use levels have been fairly constant in recent years. The following table depicts the

current status of domestic livestock grazing in the HMAs. The total authorized use within the HMAs is 14% of the total domestic livestock use authorized within the RFO.

HMA	# of oper	# of Allot	Active Pref	Kinds	Seasons
Adobe Town	15	15	29,781 aums	Sheep, cattle	W, Sp, S, F
Stewart Creek	3	2	9,763 aums	cattle	S, W
Lost Creek	5	1	28,230 aums	Sheep, cattle	W, S

F. VEGETATION AND SOILS

The majority of soils in all the HMAs are desert soils developed under low precipitation with minimal topsoil development--Aridisols and Entisols. The soils are mostly fine textured with areas of sand dunes, badlands, and salty areas with severe erosion potentials when disturbed. Loss of topsoil from these desert soils leads to an irreplaceable loss in soil productivity, and thus ability to regain natural plant communities if lost. The same range of soil conditions is encountered in all three HMAs. The major differences amongst the HMAs are in the relative abundance of these conditions. In the Stewart Creek and Lost Creek HMAs, coarser-textured areas are more common while badlands are more common in the Adobe Town HMA.

Adobe Town HMA
Plant communities are very diverse in this large area. The most abundant plant community in this HMA is sagebrush/grass. Other plant communities present are: desert shrub, grassland, mountain shrub, lentic riparian grass/sedge, limber pine woodlands, juniper woodlands, and a very few aspen woodlands. Needle and thread, Indian ricegrass, bluebunch wheatgrass, western wheatgrass, junegrass, and mutton bluegrass are the predominate grasses. Wyoming sagebrush, black sagebrush, bud sage, salt sage, fourwing salt bush, greasewood, bitterbrush, and mountain mahogany are important shrub species.

Stewart Creek HMA
The most abundant plant community in this HMA is sagebrush/grass. Other communites present are: desert shrub and grassland, with limited lentic riparian grass/sedge, juniper woodland, mountain shrub and desert willow riparian types. Needle and thread, Indian ricegrass, bluebunch wheatgrass, western wheatgrass, junegrass, and mutton bluegrass are the predominate grasses. Wyoming sagebrush, black sagebrush, bud sage, salt sage, fourwing salt bush, and greasewood are important shrub species.

Lost Creek HMA
The most abundant plant community in this HMA is sagebrush/grass. Other communites present are: desert shrub, grassland, and lentic riparian grass/sedge primarily associated with desert wetland areas. Needle and thread, Indian ricegrass, bluebunch wheatgrass, western wheatgrass, junegrass, and mutton bluegrass are the predominate grasses. Wyoming sagebrush, black sagebrush, bud sage, salt sage, fourwing salt bush, and greasewood are

important shrub species.

G. RECREATION

Although demand is not high, some members of the public enjoy seeing wild horses roaming free. Both residents and non-residents occasionally make special trips to the RFO to view wild horses in their natural environment. Other recreation in the HMAs is quite dispersed with the greayest amount occurring during the hunting seasons for the various game animals and birds.

No developed recreation sites exist within the HMAs.

RECREATION RESOURCES AND USES WITHIN THE HMAs

Adobe Town HMA	Primary recreational activities in the area include: hunting for pronghorn antelope, mule deer, upland game birds, coyotes, and small game; camping, hiking, rock hounding, photography, wildlife and wild horse viewing, ORV use and sightseeing.
Stewart Creek HMA	Primary recreational activities in the area include: hunting for pronghorn antelope, upland game birds, coyotes, and small game; camping, hiking, rock hounding, photography, wildlife and wild horse viewing, ORV use and sightseeing
Lost Creek HMA	Primary recreational activities in the area include: hunting for pronghorn antelope, upland game birds, coyotes, and small game; camping, hiking, rock hounding, photography, wildlife and wild horse viewing, ORV use and sightseeing

H. WILDERNESS

Adobe Town Wilderness Study Area (WSA), encompassing 85,710 acres between the Rawlins and Rock Springs Field Offices, lies within the HMA. Until it is designated wilderness or released from further consideration by Congress, it is managed under the Interim Management Policy (IMP) for lands under wilderness review. Under the IMP, WSAs are managed to preserve their wilderness character (naturalness, solitude, and opportunities for primitive recreation) and suitability for designation as wilderness. Fundamental to this preservation is prohibition of new surface disturbance or permanent structures so that the WSA retains the character of an area untrammeled by man. If designated wilderness, the WSA would be managed in accordance with the Wilderness Act of 1964.

Adobe Town HMA	Adobe Town Wilderness Study Area is included in the HMA
Stewart Creek HMA	Not in proximity to any RFO WSA
Lost Creek HMA	Not in proximity to any RFO WSA

I. RIPARIAN AREAS

Riparian areas are limited in nature and extent within the HMAs. This adds to their importance. Within the HMAs, as elsewhere in the Field Office jurisdiction, riparian areas are extremely important components of the landscape, providing essential habitat requirements to a wide variety of consumptive and nonconsumptive uses of the public lands. Included are forage, cover, water, breeding and rearing areas, and numerous essential hydrologic functions.

Riparian areas are important enough to warrant special policy and management considerations. The BLM policy with regard to riparian areas on public lands under its jurisdiction is for all riparian areas that are not currently properly functioning to be converted to proper functioning condition through application of appropriate management and to ensure that riparian areas that are properly functioning are maintained in their present condition.

Within all wild horse HMA's water sources are sparse. Stream segments with perennial flow characteristics are rare and often have upstream and downstream reaches that are ephemeral. The presence or absence of water in the channel appears to be determined foremost by the distance to a perennial water source. Far more commonly, duration of streamflow is ephemeral; Streams flow only in response to precipitation events and spring snowmelt.

General Description of the Physical Hydrologic Regime for the HMAs
The HMAs lie within two major drainages in Wyoming. The Great Divide Basin, an internally-drained basin, is non-contributory to any major river system in the state. Most of the Stewart Creek HMA and all of the Lost Creek HMA are contained within this basin.

The Adobe Town HMA is completely within the the Colorado River Drainage via the Little Snake River drainage and the Green River drainage, two tributary drainages.

Water Balance
Precipitation ranges from 4 to 12 inches per year in the HMAs. Net potential evapotranspiration is 21-23 inches, resulting in a net annual water balance (deficit) of 10-19 inches. This makes the relative lack of abundance of water in the HMAs a critical limiting factor for animal survival.

Streamflow
The majority of the streams in the HMA's are ephemeral in nature, transporting water only in response to runoff from storm events. These ephemeral drainages do not have active flow for long enough to develop riparian vegetation communities. A few isolated streams have some perennial flow and support small riparian vegetation communities.

Adobe Town HMA
Shell Creek has perennial flow in the Adobe Town HMA, and a substantial riparian community, although the percent of the stream channel that is on public land is less than 2 miles through the entire creek length. Springs

form on the east side of the Kinney Rim, and result in isolated lentic riparian areas that total less than 20 acres. Similarly, lentic riparian develops along the north face of the Powder Rim. Channelized flow downstream of these springs and seeps typically continues for less than 1/16th mile before infiltrating and being lost to subsurface flow.

Stewart Creek HMA

Segments of stream within the Stewart Creek HMA that have perennial flow and riparian communities are located on Lost Soldier Creek, Bull Springs Creek, Stewart Creek, and Iron Springs Draw. Of these streams, Lost Soldier Creek and Iron Springs Draw have greater than 1 mile of riparian on federal land. Stewart Creek has less than 1/8 of a mile of public riparian, and Bull Springs Creek has no public land riparian communities.

Lost Creek HMA

Geographically, this HMA is nearest the center of the Great Divide basin, and generally has fewer reliable water sources. Red Creek and Lost Creek have the most significant ephemeral stream flow, however flows in all streams within the HMA lack the hydroperiod to develop and maintain riparian vegetation. Ephemeral lakes form as discharge areas for alluvial groundwater in the southern areas of the HMA and hold water for 1 to 3 months in the spring. Springs are isolated throughout the MMA, and, where present provide perennial water. However, the net water deficit and permeable surface material cause the water to rapidly dissipate. Because of water scarcity, perennial springs are frequently appropriated and occur most commonly on private or state land. Riparian communities are rare on federal land in the Lost Creek HMA.

Ungulate use around lentic riparian areas in the Lost Creek HMA has had a long term negative effect due to the relative sparseness of water and the fragility of the systems.

Riparian Assessment

The BLM method for determining the condition of riparian areas is named Proper Functioning Condition (PFC). It is conducted by an interdisciplinary team composed of professional specialists employed by the land management agency. Thus, Proper Functioning Condition is a desirable condition and the name of a federal inventory procedure. Riparian areas are said to be *proper functioning* if adequate vegetation, landform or woody debris is present to dissipate water energy associated with high stream flow.

A General Description of the PFC inventory

Proper functioning condition is an interdisciplinary inventory to assess the condition of riparian areas. An attempt is made to broaden the team that conducts the assessment by ensuring that each team member represents a different specialty. The rating falls into three categories, Proper functioning, Functioning at Risk, and Non-Functioning. The Functioning-at-Risk category is subdivided to reflect trend in condition, either up, down, or not apparent. This effectively increases the possible number of rating

categories to five.

Properties of Properly Functioning Riparian Areas
A properly functioning riparian area normally exhibits several distinct characteristics that are desirable and assist in water storage, maintenance of channel stability, and improvement of water quality. Characteristics are: 1) Purification of water by removing sediment; 2) Reduction in the risk of flood damage by storing water (attenuates the hydrography); 3) Reduces channel erosion; 4) Increases baseflow of streams due to slow release of stored water; 5) Supporting plant and wildlife diversity; 6) Water forage and shade for livestock; and 7) Increased recreational opportunities (BLM. 1993).

Currently, within the Wild Horse HMA's, lotic interdisciplinary PFC has been completed on 9.5 miles of stream. The results are summarized in table A. Lentic PFC has been competed on 41.5 acres for all HMA's. The results are summarized in table B.

Table A. Current status of lotic riparian PFC inventory on public land in the Wild Horse and Burro Management areas. 'Negligible' indicates that small isolated areas probably exist on streams in remote areas.

Herd Management Area	Proper Functioning Condition Rating				
	Proper Functioning (mi)	Functioning at Risk Trend Upward (mi)	Functioning at Risk Trend not Apparent (mi)	Functioning at Risk, Trend Downward (mi)	Not Functioning (mi)
Adobe Town	0.0	0.125	1.125	0.0	0.0
Stewart Creek	7.0	0.0	1.125	0.125	0.0
Lost Creek	0.0	0.0	0.0	Negligible	Negligible

Table B. Current status of lentic riparian PFC inventory on public land in the Wild Horse and Burro Management areas.

Herd Management Area	Proper Functioning Condition Rating				
	Proper Functioning (ac)	Functioning at Risk Trend Upward (ac)	Functioning at Risk Trend not Apparent (ac)	Functioning at Risk, Trend Downward (ac)	Not Functioning (ac)
Adobe Town	1.5	5.0	5.0	7.5	2.5

Stewart Creek	0.0	0.0	5.0	5.0	0.0
Lost Creek	0.0	0.0	0.0	5.0	5.0

J. PRIVATELY-OWNED AND CONTROLLED LANDS
TABLE

HMA	PRIVATELY CONTROLLED	PERCENT OF HMA
Adobe Town	29,000	6.1%
Stewart Creek	11,000	6.6%
Lost Creek	15,000	6.0%

Privately owned or controlled lands comprise 6% or more of each individual HMA. In addition to their proportionate contribution to the forage and space requirements for all the animals that utilize the HMAs, a disproportionately high share of the reliable water sources in the HMAs occur on these lands.

K. SOCIOECONOMICS
The other uses of the public land within the HMAs yield a variety of direct and indirect economic benefits, and the public rangelands are an important aspect of the sense of place that is the essence of the west. For the purpose of this analysis, the regional and national impacts are not quantified. Locally, the analysis area serves many purposes to the local, regional, and national populations. The primary direct effects are local in nature. As with other values/effects, the socio economic values need not be mutually exclusive. Maintaining a mix is consistent with the direction of the act to maintain the multiple use relationship that presently exists within the areas. The following list represents the multiple use relationship that currently exists within and adjacent to the HMAs.

PUBLIC LAND USE	ECONOMIC VALUES	CULTURAL VALUES
Wild horse habitat	recreation, adoption	lifestyle, character
Livestock raising	meat, fiber, jobs	lifestyle, character
Big game hunting	meat, recreation, jobs	lifestyle, self reliance
Dispersed recreation	indirect expenditures	lifestyle, freedom
Energy Production	Royalties, employment	lifestyle, independence

IV. ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This environmental assessment (EA) focuses on the impacts that the alternative management strategies will have on wildlife, cultural resources, wild horses, domestic livestock, wilderness, recreation, soils and vegetation, riparian areas, recreation uses, socioeconomics, and private lands and interests in and adjacent to the HMAs in the three timeframes described earlier. Wildlife, livestock, and wild horses all depend on the forage and habitat in the herd areas and would be affected by the management of wild horses. As alternative methods are identified for the attainment of some of the actions, comparative differences in the probable effects of the alternative methods are described. The analysis is presented in a comparative format with the effects of each alternative on each of the components of the affected environment. The summary tables use this convention:

Very Positive Impact	++
Slightly Positive Impact	+
No Impact	O
Slightly Negative Impact	-
Very Negative Impact	--
Analysis Inconclusive	X

ENVIRONMENTAL IMPACTS ON SPECIFIC COMPONENTS OF THE ENVIRONMENT

B. WILDLIFE

GENERAL

The following immediate short term impacts may occur to wildlife species under Alternatives #1, 2, and 4. There would be no wild horse gathers conducted in Alternative # 3, therefore, these impacts would not occur under that alternative. Gathering wild horses, whether it be for adoption, emergency control, and/or fertility control, involves setting up wild horse traps and using saddle horses and helicopters to gather the horses and trucks to transport them to a holding facility in preparation for adoption. To reduce impacts to raptor species that may be nesting in all three of the HMAs, construction and other activities potentially disruptive to nesting raptors would be prohibited within areas identified as raptor nesting areas during the period of February 1 to July 31 for the protection of nesting raptors. To reduce impacts to sage grouse in all three HMAs, trap construction and other activities potentially disruptive to strutting and nesting sage grouse would be prohibited within designated sage grouse strutting and nesting areas between March 1 and June 30 for the protection of sage grouse. Construction and other activities potentially disruptive to wintering wildlife would be prohibited within occupied crucial winter range during the period of November 15 to April 30 for the protection of, as well as reduce impacts to, antelope and mule deer using crucial winter range in the Adobe Town HMA and antelope using crucial winter range in the Stewart Creek HMA. All of these areas of potential conflict are delineated on maps maintained in the Rawlins Field Office. Wyoming Game and Fish Department input is regularly sought in the delineation of these areas and applicants for other uses of the public lands

are frequently required to provide input to these data, as well. In addition, wild horse populations will have continuing, long term effects on the habitats which they share with other animals.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Nonthreatened Wildlife Species

Under this alternative, individual PMAs would be planned on a herd by herd, year by year basis and this would achieve and maintain the AMLs established by other processes outlined in the HMAPs. Under this alternative, the horses left on the range would have adequate forage, water, and space. Wildlife species should be able to live in a natural ecological balance within the HMAs and adjacent to them. The wild horse gathering process in general should not impact wildlife species as stipulations and mitigation measures are routinely employed to prevent that. There may be some temporary displacement of wildlife during the roundups; however, large game species should return to the area within a few days. Antelope forage on sagebrush while mule deer forage on forbs, shrubs, and some grasses, therefore, competition for vegetation should be minimal. There may be competition for the use of water sources. If the population levels of the wild horses remain in balance with the landscape, then impacts to water sources and direct competition for use of the sources should be minimal.

In all three HMAs, there are sage grouse leks and potential nesting habitat that tend to contain sagebrush pockets in drainages and draws or on the flats. Most of the natural landscapes within the HMAs contain grass dominated areas with low growing forbs and/or badlands-type habitats, which are not used by grouse for nesting and/or brood rearing. In general, the impacts to sage grouse strutting and nesting areas should be minimal provided that the horse population is in balance with the ecosystem; and any projects that may occur as a result of implementing the EA will have site-specific EAs completed and surface disturbing activities associated with the action will not occur between March 1 and June 30 for the protection of strutting and nesting sage grouse. Under the proposed action, raptor species should not be impacted by wild horses and implementation of management actions.

Endangered, Threatened, and Proposed Species

The mountain plover has the potential to occur in all three HMAs. The limiting factor for this species tends to be nesting habitat. Wild horses that use the range in balance with the ecosystem should not impact the mountain plover, therefore, implementing the wild horse management plans is not likely to adversely affect the mountain plover. The implementation of the wild horse management EA, such as the use of saddle horses and helicopters. is not likely to adversely affect the mountain plover; however, any surface-disturbing activities would not be allowed during the reproductive period of April 1 through June 30 within 200 meters of identified concentration areas to reduce impacts to nesting mountain plover. Concentration areas are defined as areas where broods and/or adults have been found in the current year or documented in at least two of the past five

years.

The overall decline of swift fox has been attributed to the destruction of native prairie habitat from agricultural practices, predator and rodent control programs, trapping, hunting, exotic plant community invasions (weeds), coal and petroleum extraction activities, roads, domestic dogs, and overutilization of rangeland from grazing practices. There may be swift fox in all three HMAs; however, wild horse use in balance with the ecosystem is not likely to adversely affect the swift fox. Roundup practices themselves, such as the use of saddle horses and helicopters, are also not likely to adversely affect swift fox; however, any surface disturbing activity, such as the construction of corrals, potentially disruptive to denning fox are prohibited within or adjacent to identified denning areas. during the period from March 1 to July 31 for the protection of the swift fox.

The black-footed ferret relies heavily on prairie dog towns for both food sources and habitat. Wild horses that use the habitats within the HMAs in balance with the natural ecosystem are not likely to adversely affect the black-footed ferret. Roundup procedures themselves, such as the use of saddle horses and helicopters, are also not likely to adversely affect the black-footed ferret, especially since riders avoid prairie dog towns for the safety of their horses. During the roundup procedures any corrals that are built would be assessed for potential black-footed ferret habitat. There is always a chance that prairie dogs may move into an area after a field check has been completed for a particular project. When the actual project is constructed, whether it be permanent or temporary corrals for example, the area would be rechecked. If a new town has been established within and adjacent to a particular project, and the project site qualifies as potential black-footed ferret habitat, then the project would either have to be moved or a survey of the site and informal/formal consultation with the U.S. Fish and Wildlife Service completed.

Although it is highly unlikely that lynx use the habitat types located within the HMAs, it is always possible that the species may cross country within or adjacent to the HMAs. Wild horse management practices, such as the use of saddle horses and a helicopter for round-up practices, should not negatively impact the lynx or cause harm to an individual animal; therefore, the implementation of the EA may affect, but is not likely to adversely affect, the species. If a wild horse trap or project associated with the implementation of the EA is located near a den, which is highly unlikely, then the project would not be initiated until informal/formal consultation with the Service has occured.

Wild horse use within the Adobe Town HMA in balance with the natural ecosystem is not likely to adversely affect the four Colorado River system species: the humpback chub, bonytail sucker, razorback sucker, and Colorado squawfish. Wild horse management practices in general, such as the use of horseback riders and a helicopter for round-up practices, should not affect the four fish species; however, projects that may occur as a result of implementing the EA (i.e,, spring developments/ponds for water) may affect, but are not likely to adversely affect the fish species since an individual EA and biological

assessment will be completed for each site-specifc project at that time.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2:

Nonthreatened Wildlife Species

Under this alternative, animals inside HMAs may experience increasing intra specific competition for habitat as the horse population increases. After habitat stress becomes severe, emergency situations would develop that would require wild horse gathers. There may be some competition for water sources, and possibly forage under severe conditions, depending on the length of time that horse herds are allowed to expand and when emergency roundups occur. The roundup process in general should not impact wildlife species if stipulations and mitigation measures are practiced. There may be temporary displacement of wildlife during the roundups; however, large game species should return to the area within a few days.

In all three HMAs, there are sage grouse leks and potential nesting habitat that tend to contain sagebrush pockets in drainages and draws or on the flats. Most of the natural landscapes within the HMAs contain grass-dominated areas with low-growing forbs and/or badlands-type habitats which are not used by grouse for nesting and/or brood rearing. Prior to horse gathers, sage grouse may become impacted if vegetation required for nesting, specifically residual grasses within and adjacent to sagebrush pockets, becomes depleted. Under these conditions, nest failure may occur. If roundups occur to reduce the impacts from horse use within the HMAs, then the impacts to grouse may decrease, in addition, surface disturbing activities will not occur from March 1 to June 30 to reduce impacts to strutting and nesting sage grouse. Under this alternative, raptor species should not be impacted by wild horses and implementation of management actions.

Endangered, Threatened, and Proposed Species

The mountain plover has the potential to occur in all three HMAs. The limiting factor for this species tends to be nesting habitat. Under this alternative, horses within the HMAs may experience intraspecific competition for forage and water sources, but after habitat stress becomes severe, then emergency roundups would be implemented. During roundup procedures, surface-disturbing activities would not be allowed during the reproductive period of April 1 through June 30 within 200 meters of identified concentration areas to reduce impacts to nesting mountain plover. Concentration areas are defined as areas where broods and/or adults have been found in the current year oe documented in at least two of the past five years. Mountain plover actually nest and forage in disturbed areas, therefore, implementing this alternative, provided that mitigation measures are practiced during roundup procedures, is not likely to adversely affect the mountain plover.

The overall decline of swift fox has been attributed to the destruction of native prairie habitat from agricultural practices, predator and rodent control programs, trapping, hunting, exotic plant community invasions (weeds), coal and petroleum extraction activities, roads, domestic dogs, and

overutilization of rangeland from grazing practices. There may be swift fox in all three HMAs. As stated above, roundups would be implemented when intra-specific competition for forage and water becomes severe for the horses and range conditions deteriorate. Roundup practices themselves, such as the use of saddle horses and helicopters, are also not likely to adversely affect swift fox; however, any surface disturbing activity, such as the construction of corrals, potentially disruptive to denning fox are prohibited during the period from March 1 to July 31 for the protection of denning areas.

The black-footed ferret relies heavily on prairie dog towns for both food sources and habitat. Roundup practices would be implemented when intra-specific competition for forage and water becomes severe, therefore, implementing this alternative is not likely to adversely affect the ferret. Roundup practices themselves, such as the use of saddle horses and helicopters, is not likely to adversely affect black-footed ferrets. During the roundup procedures, any corrals that are built would be assessed for potential black-footed ferret habitat (prairie dog towns). There is always a chance that prairie dogs may move into an areas after a field check has been completed for a particular project. When the actual project is constructed, whether it be permanent or temporary corrals for example, the area would be rechecked. If a new town has been established within and adjacent to a particular project, and the project site qualifies as potential black-footed ferret habitat, then the project would either have to be moved or a survey of the site and informal/formal consultation with the Service completed.

Although it is highly unlikely that lynx use the habitat types located within the HMAs, it is always possible that the species may cross country within or adjacent to the HMAs. Wild horse management practices, such as the use of saddle horses and a helicopter for round-up practices, should not negatively impact the lynx or cause harm to an individual animal; therefore, the implementation of the EA may affect, but is not likely to adversely affect, the species. If a wild horse trap or project associated with the implementation of the EA is located near a den, which is highly unlikely, then the project would not be initiated until informal/formal consultation with the Service has occurred.

Wild horse use within the Adobe Town HMA in balance with the natural ecosystem is not likely to adversely affect the four Colorado River system species: the humpback chub, bonytail sucker, razorback sucker, and Colorado squawfish. Wild horse management practices in general, such as the use of horseback riders and a helicopter for round-up practices, should not affect the four fish species; however, projects that may occur as a result of implementing the EA (i.e,, spring developments/ponds for water) may affect, but are not likely to adversely affect the fish species since an individual EA and biological assessment will be completed for each site-specifc project at that time.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3:

Nonthreatened Wildlife Species

Unmanaged populations of wild horses might eventually stabilize at very high

numbers near what is known as their food-limited ecological carrying capacity. At these levels, range conditions would probably deteriorate significantly. Due to the lack of large predators to limit population growth in the HMAs wild horse numbers would eventually exceed the carrying capacity of the HMAs and adjacent areas. Competition for water may increase between wildlife species, specifically antelope and mule deer. There would probably be competition for water sources throughout the HMAs and, under severe stress to habitats, competition for forage resources as well. Inter specific competition over time could affect antelope and mule deer, especially in crucial winter ranges. Large game species may be displaced over time and population levels and overall health of the herds could diminish. Due to similar dietary preference, elk would probably be the most noticeably affected species in the short term.

In all three HMAs, there are sage grouse leks and potential nesting habitat that tend to contain sagebrush pockets in drainages and draws or on the flats. Most of the natural landscapes within the HMAs contain grass-dominated areas with low-growing forbs and/or badlands-type habitats which are not used by grouse for nesting and/or brood rearing. Sage grouse may become impacted from deteriorated range condition if vegetation required for nesting, specifically residual grasses within and adjacent to sagebrush pockets, becomes depleted. Under this alternative, raptors would not be impacted by wild horses and implementation of management practices.

Endangered, Threatened, and Proposed Species

The mountain plover has the potential to occur in all three HMAs. The limiting factor for this species tends to be nesting habitat. Although range condition are likely to deteriorate from intra- and inter-specific competition between wild horse, livestock, and wildlife, the conditions are not likely to adversely affect the mountain plover since this bird prefers disturbed areas.

The overall decline of swift fox has been attributed to the destruction of native prairie habitat from agricultural practices, predator and rodent control programs, trapping, hunting, exotic plant community invasions (weeds), coal and petroleum extraction activities, roads, domestic dogs, and overutilization of rangeland from grazing practices. There may be swift fox in all three HMAs. Inter- and intra-specific competition for forage and water resources which deteriorate range conditions may impact the fox, specifically if prey species decline in population numbers. Excessive wild horse populations on the range may create severe conditions for the swift fox, but individuals would probably relocate to more suitable habitat. Although implementing this alternative may impact fox in the immediate area, it is not likely to adversely affect the fox species in general.

The black-footed ferret relies heavily on prairie dog towns for both food sources and habitat. The horse populations under this alternative would not be managed and although the horses may stabilize at very high numbers near the carrying capacity, the range conditions would become deteriorated before that balance is reached. Under these conditions, there may be some impacts to

prairie dogs if competition for forage becomes too severe. These conditions may persist, but over time should be alleviated when the horse populations readjust themselves to lower levels. Although the range conditions would deteriorate, there should not be any adverse affects to the black-footed ferrets over time. There has not been a recorded sighting of a ferret in the HMAs since the 1980s, and although the species could be present, the impacts from wild horses in the area probably would not be detrimental to the species.

Although it is highly unlikely that Canada lynx use the habitat types located within the HMAs, it is always possible that the species may cross country within or adjacent to the HMAs. In this alternative, there are no management actions that would occur and, although range conditions would deteriorate which may affect prey species, the implementation of this alternative may impact the Canada lynx in the immediate area, but it is not likely to adversely affect the lynx in general

Wild horse use within the Adobe Town HMA is not likely to adversely affect the four Colorado River fish species. Water depletions to the system have the ability to impact the species and since there would not be any direct management of the horses from implementing Alternative 3, then there should not be any impacts to the species from water depletion projects.
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ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE # 4

Non-threatened Wildlife Species

In this alternative, horse numbers would first increase then decrease over time. A regular program would be implemented to administer fertility control agents to the female segment of the population on a recurrent basis. There may be some competition between wild horse and big game species for water sources, and possibly forage sources under severe conditions, but implementation of this alternative should decrease wild horse numbers over time and range conditions should improve. There would be a roundup process involved under this alternative which should not impact big game species if stipulation and mitigation measures are practiced. There may be temporary displacement of wildlife during the roundups; however, large game species should return to the area within a few days.

In all three HMAs, there are sage grouse leks and potential nesting habitat that tend to contain sagebrush pockets in drainages and draws, or on the flats. Most of the natural landscapes within and adjacent to the HMAs contain grass dominated areas with low growing forbs and/or badlands-type habitats, which are not used by the grouse for nesting and/or brood rearing. Prior to horse gathers for fertility control treatments, sage grouse may become impacted if vegetation required for nesting, specifically residual grasses within and adjacent to sagebrush pockets, becomes depleted. Fertility control practices should reduce horse numbers over time and allow range conditions to rejunevate. Under improved range conditions, sage grouse numbers should remain stable, therefore, implementing this alternative should not adversely affect the grouse.

Endangered, Threatened, and Proposed Species

The mountain plover has the potential to occur in all three HMAs. The limiting factor for this species tends to be nesting habitat. This alternative allows the horse populations to remain in balance with the ecosystem when the fertility control program is implemented. Although this may take time for the populations to adjust implementing the management plan is not likely to adversely affect the mountain plover. During roundup procedures, surface-disturbing activities would not be allowed during the reproductive period of April 1 through June 30 within 200 meters of identified concentration areas to reduce the impacts to nesting plovers. Concentration areas are defined as areas where brood and/or adults have been found in the current year or documented in at least two of the past five years.

The overall decline of swift fox has been attributed to the destruction of native prairie habitat from agricultural practices, predator and rodent control programs, trapping, hunting, exotic plant community invasions (weeds), coal and petroleum extraction activities, roads, domestic dogs, and overutilization of rangeland from grazing practices. There may be swift fox in all three HMAs; however, the use of fertility control measures should allow the horse populations to become stabilized and in balance with the natural ecosystem, therefore, the implementation of Alternative 4 is not likely to adversely affect the swift fox. Roundup practices themselves, such as the use of saddle horses and helicopters to administer the fertility control program, are also not likely to adversely affect the swift fox; however, any surface-disturbing activity, such as the construction of corrals, potentially disruptive to denning fox are prohibited during the period from March 1 to July 31 for the protection of denning areas.

The black-footed ferret relies heavily on prairie dog towns for both food sources and habitat. Wild horses that use the habitat within the HMAs in balance with the ecosystem are not likely to affect the black-footed ferret. This alternative allows the horse population to eventually become in balance with the habitat after fertility control practices are implemented. Roundup practices themselves should also not impact the ferret. During the roundup procedures any corrals that are built would be assessed for potential black-footed ferret habitat. The assessment would be completed as that stated in Alternative 1 and if potential black-footed habitat is found then the project would either have to be moved or a survey of the site and informal/formal consultation with the Service completed.

Although it is highly unlikely that lynx use the habitat types located within the HMAs, it is always possible that the species may cross country within or adjacent to the HMAs. Wild horse management practices, such as the use of horseback riders and a helicopter for round-up practices, should not negatively impact the lynx or cause harm to an individual animal; therefore, the implementation of the EA may affect, but is not likely to adversely affect, the species. If a wild horse trap or project associated with the implementation of the EA is located near a den, which is highly unlikely, then the project would not be initiated until informal/formal consultation with the Service has occurred.

Wild horse use within the Adobe Town HMA in balance with the natural ecosystem is not likely to adversely affect the four Colorado River system species: the humpback chub, bonytail sucker, razorback sucker, and Colorado squawfish. Wild horse management practices in general, such as the use of horseback riders and a helicopter for round-up practices, should not affect the four fish species; however, projects that may occur as a result of implementing the EA (i.e,, spring developments/ponds for water) may affect, but are not likely to adversely affect the fish species since an individual EA and biological assessment will be completed for each site-specifc project at that time.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES TO NON-THREATENED WILDLIFE SPECIES											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	+	O	-	--	O	-	--	O	-	O

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES TO THREATENED, ENDANGERED, and PROPOSED WILDLIFE SPECIES											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	+	O	-	--	O	-	--	O	--	O

C. CULTURAL, HISTORIC RESOURCES

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Cultural resources would not be impacted as all potentially disturbing activities would be subject to cultural clearance and mitigation practices.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Cultural resources would not be significantly impacted as all potentially disturbing management actions would be subject to cultural clearance and mitigation practices. Some increase in site disturbance through trampling would occur where horse populations increased significantly.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

There would be no gathering or other handling and therefore no adverse effects associated with the construction of traps or other facilitities. Increased numbers of horses would trample on an unknown number of sites.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Cultural resources would not be impacted as all potentially disturbing activities would be subject to cultural clearance and mitigation practices.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON CULTURAL RESOURCES											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	O	O	-	-	O	-	--	O	0	0

D. WILD HORSES

Impacts upon the habitat and other uses and users of the habitat are primarily a function of scale. One hundred horses will have a similar effect on their surroundings be they bay or gray, 50% or 60% female, average age three or 12, genetically viable or not. Impacts to individual animals will primarily consist of an event either happening or not. Impacts to the herds and to the species, on the other hand, can be much more complex and elusive.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Under this alternative, horses left on the range would have adequate forage, water and space. A thriving natural ecological balance would exist within the HMAs and adjacent to them. Death and injury would occur in gathering. Different methods have different hazards. Adopted animals would undergo a lifestyle change. Approximately 1,800 horse would be placed in the Adopt-a-horse program to attain AML. After attainment of AML, approximately 200 horses per year would be placed in the Adopt-a-horse program and undergo the same lifestyle change. In the long term, annual horse deaths would be approximately 162, consisting of 150 from natural mortality and 12 from stress/trauma associated with handling by the BLM. The average age of the population would increase slightly for the first ten years and then decline slightly as it returned toward beginning levels. After 30 years, the age distribution would look very much like the initial age distribution. Growth rate would remain pretty stable at 14%.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Under this alternative, horses inside HMAs would experience severe competition for necessary habitat components as the population increased. A thriving natural ecological balance would not be achieved. For a time, horses would be spared the stresses of handling as there would be no regular PMAs. After habitat stress became severe, emergency situations would develop that would require gathers. At first, no horses would be subject to the lifestyle change associated with the Adopt-a-horse program. Eventually, about 600 horses per year would have to be removed in response to emergency situations and landowner requests. These horses would be placed in the Adopt-a-horse program and undergo a lifestyle change. The horses needing emergency gathering would often be sick or weak. In the long term, annual horse deaths would be approximately 520, consisting of 500 from natural mortality and 20

from stress/trauma associated with handling by the blm. The age distribution would be unaffected within the HMAs.

The degree and extent of these effects would be a function of the increased population levels, over time. While it is difficult to predict exactly what those levels would become, it is possible to predict what the results of a given number of years of uncontrolled population increase could be. The table below utilizes the observed rates of increase for the individual HMAs and projects 5, 10, and 20 years of growth at those observed rates. Actual population levels experienced would be affected by a variety of factors as reproductive rates would most likely change in response to environmental conditions and horses have shown a marked tendency to leave areas of intense competition in search of "greener pastures."

HMA	AML	99 EOY POP	GROWTH RATE	5 years	10 years	20 years
Adobe Town	700	900	16%	1890	3970	17,515
Lost Creek	70	300	18%	686	1570	8,218
Stewart Creek	150	350	18%	801	1832	9,588

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

Under this alternative, horses would not experience the stress associated with gathering, removal or adoption. Recent research has shown that unmanaged populations of wild horses might eventually stabilize at very high numbers near what is known as their food limited ecological carrying capacity. At these levels, however, the herds would show obvious signs of ill-fitness including poor individual animal condition, low birth rates, and high mortality rates in all age classes due to disease and/or increased vulnerability to predation. In addition, supporting range conditions would noticeably deteriorate. As populations increased, competition for space would increase with all the associated stress. Due to the lack of large predators to limit population growth, numbers would eventually exceed the carrying capacity of the HMAs and adjacent areas. Social interaction would change. Horses would die of starvation, disease, or from lack of water. As other uses within the HMAs were curtailed, water, roads, etc available for use by horses and people wishing to view them would decline. In the long term, annual horse deaths would be approximately 2000, all from natural mortality. This average mortality would be comprised of a wide range of events. As many as 7000 horses could die in a single bad winter and then several seasons might pass with only 500-1000 deaths from a variety of causes. Effect on the age distribution could not be predicted as different environmental events would affect different segments of the population disproportionately.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Under this alternative, horse numbers in the HMAs would first increase and then decrease, over time. A regular program of gathering would be implemented

in order to administer fertility control agents to the female segment of the population on a recurrent basis. This could subject as many as 1300 horses per year to the stress of gathering and handling. The frequency of gathering would be determined by the agent being used. The average age of the population would increase as the rate of reproduction was curtailed. The place of reproductive behaviors in Wyoming herds is not understood. Changes would be expected to occur as the presence of young became less common to rare. Changes in band structure/behavior might occur as mares successfully treated with PZP would continue to cycle throughout the summer season, placing more and different demands on the stallions. Band life and particularly interraction amongst bands would likely become noticeably more chaotic as competition for estrous mares was increased. Death and injury would continue to occur in conjunction with the administration of the agents. The number of animals that underwent the stress associated with adoption would be eliminated. Repeated handling would habituate horses to human presence, comprimising their wild nature. Using the population model, the future of each herd would be modeled to show how the population would be expected to react over the period required to reach AML and what the populations might look like then for each herd. In the long term, annual horse deaths would be approximately 170, consisting of 150 from natural mortality and 20 from stress/trauma associated with handling by the BLM. The average age of the population would increase as the birth rate was decreased.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON WILD HORSES											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	+	+	O	-	--	O	-	--	O	-	X

5. Probable Effects of Some Specific Practices on Wild Horses

The number of possible permutations of all the various Management Actions that comprise a particular management strategy is huge. Therefore it is desirable to focus on three specific areas and to reveal the potential effects to the horses from the range of practices that might be employed. Then it will be possible to examine a few particular combinations in order to insure that a particular course of action is responsible.

a. EFFECT OF SELECTIVE REMOVAL ON WILD HORSES

It is BLM policy that unadoptable horses will not be removed from the public rangelands. Since unadoptable is a value judgement which will change with time, it becomes necessary to continually review and adjust the criteria used to determine which horses to remove from a population and which to leave. Thus, an alternative cannot be formulated and selected which could be determined through analysis to be more or less desirable than another. Rather, the comparative effects of a range of practices can be evaluated and disclosed. From that managers can be aware of the long range implications of whatever strategies they employ and adjust and mitigate as indicated.

1. EFFECT OF SELECTIVE REMOVAL ON INDIVIDUAL WILD HORSES

Selective removal criteria will have a very straightforward effect on individual horses. If a horse meets the criteria for removal, it will be subject to an increased period of handling associated with processing and transport in the adoption program. It will then undergo a significant lifestyle change when it is adopted and lose its wildness, very likely never to regain it. This will not ordinarily be all bad as the adopted horse will be protected from many of the stresses associated with a free-roaming lifestyle. Assuming that the adopted horse is well-cared for, which most are, it will not face the potential for death by dehydration or starvation that its wild counterparts might. It will not have to fear predators, and it will not be as likely to have to engage in potentially injurious conflicts over food, space, or water.

If a horse does not meet the criteria for removal, it will not be exposed to any of the effects associated with adoption and domestication. Changes in the selective removal criteria will change the make-up of either group of horses and thus make different individuals susceptible to the same effects. The effects of selection/non-selection will not change, the specific individuals exposed to those changes will.

2. EFFECT OF SELECTIVE REMOVAL ON ENTIRE POPULATIONS OF WILD HORSES

The effects of selective removal on entire populations of horses is less immediately apparent than the effect to individual horses. Targeting specific kinds of animals (E.G. young, male, paint) for removal changes the character of the herd remaining on the range. Horses are long-lived, especially when habitat conditions are good. If such a change effects the ability of the herd to function effectively, that must be considered. While the evaluation of the effects of selective removal tend to focus on reproduction, effective function of a population involves more than just reproduction. Simply put, removing only young horses increases the average age of a population; removing only older horses decreases the average age of a population; removing only females increases the precentage of males in the population; and, removing only males would increase the percentage of females in the population. The effect of an action on the demographics of a herd is fairly easy to predict. The potential effects of those changes in demographics on the viability and genetic integrity are a little harder to identify. Population modeling helps on both counts. It helps to predict the immediate effects of certain removal practices on population demographics. It also helps understand how these changes might interract with one another to change such things as recruitment rates or increase the vulnerability of a population to die-off or other stresses. Appendix A presents the results of an extensive analysis of the comparative effects of alternate applications of selective removal criteria and fertilty control on a model population of horses.

b. EFFECT OF TIMING/SCHEDULING VARIATIONS IN MANAGEMENT ACTIONS ON WILD HORSES

Environmental conditions are quite variable within the HMAs during the course of any given year. Many of these variations are seasonal in nature (E.G. its

cold in the winter and hot in the summer). In addition, the other users of the HMAs have some requirements that are often seasonal in nature (E.G. raptors nest in some areas of the HMAs but not all year long). It is very unlikely that any particular management action will have the same identical impacts upon the wild horses and their habitat regardless of its timing. The overarching requirements to conduct management actions in the most safe, efficient, and humane manner possible make it necessary to consider a myriad of factors when scheduling any particular management action. The following table depicts the kinds of things (Special Condition) that will be taken into account in the selection of the most appropriate time for a particular kind of action and identifies some of the adjustments in practices (Mitigation) that would be undertaken at a specific time or place. This table does not contain all of the factors that would ever be considered in the scheduling or siting of an event or practice but rather a representation of the processes that make up the procedures described in the Handbook.

MONTH	**SPECIAL CONDITION**	**MITIGATION**
JANUARY	cold, calorie budget wildlife wintering	No RPMA
FEBRUARY (early)	cold, calorie budget wildlife wintering	No RPMA
MARCH	sage grouse breeding wildlife wintering	Trap location
APRIL	late term pregnancy# mountain plover nesting sage grouse nesting	No RPMA
MAY	late term pregnancy# mountain plover nesting sage grouse nesting	No RPMA
JUNE	late term pregnancy# foaling, WL partuition mountain plover nesting sage grouse nesting	No RPMA
JULY	young colts#	SOP
AUGUST	Heat, drought	AM operations only
SEPTEMBER		
OCTOBER	Pipeline capacity	No RPMA
NOVEMBER		
DECEMBER	cold, calorie budget	No RPMA

Appendix B presents an analysis of these conditions and practices.
RPMA (Regular Population Management Action)

c. EFFECT OF FERTILITY CONTROL ON WILD HORSES

Appendix A presents the results of an extensive analysis of the comparative effects of alternate applications of Selective Removal criteria and Fertilty control on a model population of horses. This analysis is, of necessity, focused on and limited to the potential effects of varying degrees of success in any treatment strategy on the demographics of that model population and therefore the habitat. It is widely accepted that significant changes in the reproductive and young rearing behavior of any population of animals may have effects beyond the demographic arena. Those effects may be felt by individual animals, family groups, entire populations, or any combination.

The comparative physical and psychological effects of alternate treatments on individual mares is beyond the scope of this analysis and is not included.

E. DOMESTIC LIVESTOCK

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Under this alternative, there would be no long-term effect on domestic livestock from competition for habitat requirements. Temporary stress which could occur in conjunction with gathering operations would be minimized or avoided by careful attention to timing and location of activities and close communication with the owners of the domestic livestock.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Under this alternative, increasing horse populations would displace livestock in the HMAs. Displacement would be slow and indirect. As competition for forage and water increased, it would become less economically favorable to utilize the areas with domestic livestock. If authorized use levels were not reduced administratively, people would eventually stop turning out livestock in the HMAs.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

Under this alternative, increasing horse populations would first displace livestock in the HMAs and then over time in adjacent areas. Displacement would be slow and indirect. As competition for forage and water increased, it would become less economically favorable to utilize the areas with domestic livestock. If authorized use levels were not reduced administratively, permittees would eventually stop turning out livestock in the HMAs.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Under this alternative, short-term conflict would be present due to the initial increase in horse numbers and then decline as the population declined.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON DOMESTIC LIVESTOCK											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	+	O	-	--	O	-	--	O	-	O

F. VEGETATION AND SOILS

GENERAL

Wild horse management affects soils and vegetation in two distinct manners. When horses are gathered or habitat improvement practices undertaken, there are immediate short-term and usually adverse effects. In addition, wild horse population levels and the character of those populations have continuing, long-term effects on the soil and vegetative resources of the HMAs.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Adverse effects to vegetation and soils would occur at trap sites when gathers were being conducted. Gully and rill erosion would not exceed natural levels for the sites as the maintenance of AMLs would help insure that a natural ecological balance would be maintained in and adjacent to the HMAs. Perennial vegetation would continue to experience season-long grazing pressure, which is not conducive to optimum plant health and vigor. Soil erosion and plant health would contunue to be compromised around water locations, but elsewhere impacts should be minimal.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Impacts to vegetation and soils would slowly increase as population levels increased. Soil erosion would increase in proportion to herd size and vegetation disturbance. As vegetation is overused and removed from the system, topsoil will begin to erode away. The shallow desert topsoils can not tolerate much loss without losing productivity and thus the ability to be revegetated with native plants. The greater impacts would be around water locations. There would be adverse impacts to vegetation and soils at trap sites during emergency gathers. Invasive non native species could increase following increased soil disturbance and reduced native plant vigor and abundance.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

Increased use over the whole HMA would adversely impact soils and vegetation health, especially around the water locations. As native plant health deteriorates and plants are lost, soil erosion will increase. The shallow desert topsoil can not tolerate much loss without losing productivity and thus the ability to be revegetated with native plants. Invasive non native plant species would increase and invade new areas following increased soil

disturbance and reduced native plant vigor and abundance. This would lead to both a shift in plant composition towards weedy species and an irreplaceable topsoil and productivity loss from erosion. There would also be increased impacts to areas outside the HMAs as horses move out in search of better forage.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Adverse effects to vegetation and soils would occur at trap sites when gathers were being conducted for the purpose of administering fertility control agents. There may be a slight increase in soil erosion and an associated decrease in plant vigor as herd numbers increase, but they should return to natural levels after the herd numbers stabilize in the long-term.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON VEGETATION & SOILS											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	O	O	-	--	O	-	--	O	-	O

G. RECREATION

GENERAL

Recreation values are quite subjective. Those who wish to see wild horses might appreciate the increased viewing opportunities associated with increased herd sizes, so long as the condition of the horses remains good. Those who prefer other recreational activities that are degraded by an increase in the horse population might prefer to see smaller horse herds. Any change in the relative balance among species in the habitat is going to affect the quality of the recreational opportunities found in the HMAs. The ratings below are based on the assumption that the public wants the balance of recreational opportunities available in the HMAs to remain essentially unchanged from what it has been in recent years.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Recreational opportunities would probably be unchanged, so long as environmental factors or disease did not significantly affect the herds.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Where horse numbers increased, certain kinds of opportunities associated with the horse population would increase, although the condition of the horses could decline over time, rendering them less desirable to view. The quality of recreational opportunities associated with the quality of the habitat, such as viewing or hunting wildlife, would probably decline as the wild horse population increased beyond the carrying capacity of the habitat.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

The quality of all recreational opportunities would decline, in the long-term. Some associated with the presence of wild horses might increase in the short-term, but they would probably decline in the long-term due to the increasing occurrence of obviously malnourished horses. Recreationists would likely encounter carcasses and their scavengers more frequently when the population of horses is in decline due to insufficient feed and/or water. Thus, although the increased population of wild horses might make them easier for the recreationist to find, the experience might not be as desirable due to the poor condition of the horses.

Other recreation opportunities would also be detrimentally affected in the long run due to the habitat degradation caused by wild horse overpopulation. Game species might be pressured out of the area in search of essential resources. Viewers might not need to go to the HMAs to view wild herds because the wild horses would be forced to expand their territories outside the current HMA boundaries in order to find the feed and water they need to survive. And once they establish themselves beyond the HMA boundaries, they would upset the balance among other species in the new habitat as they used resources required for the other species. Opportunities for viewing and hunting other wildlife could be severely reduced in the long run, both within the HMAs and outside them.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Recreational opportunities would be unchanged, in the long-term. In the short-term, there would be greater viewing opportunity with increased herd sizes, but the habitat, and its other dependant species, would probably be impacted by the increased horse population until desired herd sizes are reached.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON RECREATION											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	O	O	+	-	O	+	--	O	O	O

H. WILDERNESS

GENERAL

Adobe Town Wilderness Study Area (WSA) is managed to preserve its wilderness character (naturalness, solitude, and opportunities for primitive recreation). Fundamental to this preservation is prohibition of new surface disturbance or permanent structures so that the WSA retains the character of an area untrammeled by man. Any impacts that degrade the naturalness of the WSA would impair its suitability for designation as wilderness, therefore violating the nonimpairment standard of the Interim Management Policy.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

The suitability of the WSA for wilderness designation would be unimpaired.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Impacts of an increased wild horse herd size would probably decrease the naturalness of the WSA and therefore impair its suitability for designation as wilderness. Impacts on the naturalness of the WSA could come in many forms, primarily in the form of excessive erosion due to increased horse traffic and reduced soil stabilizing vegetative cover, and a change in the number of members of other species displaced by the increased competition for resources.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

Impacts of an increased wild horse herd size would probably decrease the naturalness of the WSA and therefore impair its suitability for designation as wilderness. Impacts on the naturalness of the WSA could come in many forms, primarily in the form of excessive erosion due to increased horse traffic and reduced soil stabilizing vegetative cover, and a change in the number of members of other species displaced by the increased competition for resources. If no gathers occurred, the horses might well expand their territories far beyond the HMA boundaries to get the resources they need, proportionately reducing their impacts on the WSA, but most herds would likely continue to occupy their traditional territories until absolutely necessary, thus having a detrimental effect on the WSA in the short term as well as long term.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Impacts of an increased wild horse herd size would probably decrease the naturalness of the WSA and possibly impair its suitability for designation as wilderness. Impacts on the naturalness of the WSA could come in many forms, primarily in the form of excessive erosion due to increased horse traffic and reduced soil stabilizing vegetative cover, and a change in the number of members of other species displaced by the increased competition for resources. Whether the impacts of the increased herd size would be a serious concern would depend on how large the herd got before fertility controls had the desired effect. The sooner the desired herd size is reached, the sooner the WSA would be able to recover from the impacts associated with increased herd size.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON WILDERNESS											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	O	O	-	-	O	-	--	O	-	O

I. RIPARIAN AREAS

Potential Effect on Riparian areas from Wild Horse Management

Direct Consequences

Overabundant grazing and browsing animals can detrimentally affect the condition of riparian areas due to overuse of riparian plants and physical damage caused by loitering. Specific impacts on riparian areas from animal use may include declining water quality from increased sedimentation, declining plant vigor, and decreased stream channel stability.

Indirect Consequences

Animal use can indirectly affect riparian condition through the removal of upland forage. When upland rangeland is adversely affected through the degradation of plant communities, nearby riparian areas are subjected to additional stress associated with increased run-off and sedimentation. If sufficient upland forage is removed, domestic and other grazing animals may then be forced to concentrate more in riparian areas. Increased utilization in riparian areas may induce species changes that increase the riparian grass component. This could increase the tendency for horses to select riparian areas for food.

At sufficiently elevated use levels, increased wild horse populations could adversely affect infiltration rates from cumulative impacts on soil compaction and reduced vegetative cover on both riparian and upland sites. Compacted soil restricts water infiltration, thus increasing runoff and soil loss. Similarly, vegetative cover serves to reduce runoff water velocities, and thus to promote infiltration and reduce erosion. Increased sedimentation in streams and riparian areas is the likely result of both of these occurrences.

Assessing the contribution of Wild Horses on total riparian impacts can be done by assuming constant grazing pressure from other species, (equivalent to assuming no change in livestock grazing management and steady wildlife populations) and then estimating the probable change in riparian condition due to changes in wild horse and burro stocking.

Potential Effect on Riparian areas from Wild Horse Population Management Actions

In addition to the kinds of impacts identified above that would accrue from wild horse management in general, the action of gathering of wild horses and burros could potentially effect riparian areas. To avoid potential impacts and for a number of other reasons, traps are not located in riparian areas and thus gathers are unlikely to affect riparian ecosystems. Description of the methods used to select temporary trap sites and specific mitigative measures are included elsewhere in this document.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Under this alternative, AML's specified in each Habitat Management Plan would be achieved greater than 95% of the time. The number of horses free on the range would decline from current levels. Under this scenario, direct and indirect consequences would be less than current levels, resulting in a net reduction in the stated impacts, assuming other animal impacts are constant. Under this alternative, riparian areas could respond to prescribed management of livestock and the percentage of miles of lotic riparian habitat and acres of lentic riparian habitat in proper functioning condition would increase, over time. Prescribed changes in livestock management would be able to accomplish objectives developed for them as the total levels of grazing related impacts to riparian and associated uplands would be reduced.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

This alternative employs no population controls by the managing agency except those prescribed in emergency situations. This alternative would lead to population expansion until gathers occurred as a result of landowner complaint or other critical situations. Under this alternative, it can be assumed that the indirect consequences identified above would be significant, leading to a decline in riparian condition within the HMA's. Some direct impacts of horse use on riparian ecosystems would likely also be seen. Indicated changes in livestock management would be precluded.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

This is the 'natural' alternative and would result in population increases and decreases in response to favorable and unfavorable environmental and predator-prey relationships. Often these population swings can be dramatic and result in large population gains followed by catastrophic die-off. Habitat effects of this type of management would be the decline of riparian habitat when populations were maximum, followed by habitat recovery when horse populations declined. In the end, the extent that habitat could recover when populations were low would contribute to the determination of the extent and timing of population recovery. Effects of this alternative are highly variable, and likely to have the most unpredictable outcomes. Under this alternative, changes in livestock management would have no discernible effect on the resource.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Population control would be exercised by the management agency under this alternative using fertility control alone. The outcome of this alternative is similar to the proposed action, but only after greater than 30 years. The significant difference in the two alternatives with respect to riparian habitat is that this alternative would result in a slight decline in riparian habitat in the short and intermediate time frame, until horse populations began to be controlled by treatments.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON RIPARIAN AREAS											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	+	+	O	-	--	O	-	--	O	-	O

J. PRIVATELY-OWNED AND CONTROLLED LANDS

General

The effects of any particular alternative course of wild horse management upon privately owned and controlled lands would fall into two categories. The first, environmental effects, would not be significantly different depending on the ownership or control of the land. A particular riparian area, for instance, would be affected in the same manner by a given level of wild horse use irrespective of its ownership or form of control. The second category would be a particular amalgam of legal and attendant socio economic aspects that would tend to be quite subjective and personal and might be called value. This category would comprise a range of factors associated with a property owners rights to the enjoyment of whatever might comprise the value of that property. An important principle of our legal system provides for, under carefully prescribed conditions, that private property (or values associated with a particular piece of property) may be "taken" for public use, provided that the private owner is properly compensated and due process is employed. The Act did not authorize the taking of any privately owned or controlled lands for use by wild horses. Thus, if a particular course of action (alternative) would result in the value of privately owned or controlled property being adversely affected, the alternative would be legally unavailable as a course of action, in other words, the taking would not be authorized.

CONSEQUENCES OF ALTERNATIVE #1

There would be no Takings inside or outside of HMAs. Horse populations would be maintained at levels which would not deprive landowners of the productive value of their lands.

CONSEQUENCES OF ALTERNATIVE #2

Under this alternative, there would be no takings on lands outside of HMAs. There could be takings inside of HMAs. The time it would take for populations inside of HMAs to reach levels sufficient to utilize all the forage available on the private lands would vary amongst the HMAs. Landowners could physically exclude horses from their lands by means of legal fences and takings would then be avoided.

CONSEQUENCES OF ALTERNATIVE #3

All populations would expand without control. Horses would expand their

range. Eventually all available forage would be consumed by horses and takings would occur within the HMAs and in adjacent areas.

CONSEQUENCES OF ALTERNATIVE #4

Populations would increase for the period necessary for reproductive suppression to achieve stable populations. In some herds, the populations would remain high enough, long enough to effect temporary takings. Eventually, all populations would then decline. If and when AML was reached through these means, the level of fertility control would be decreased in order to allow sufficient reproduction to maintain the populations at AML. In most herds, this would result in some variable amount of forage remaining available for other uses throughout the period and permanent takings would thus be avoided inside HMAs. There would be no takings outside of HMAs.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON PRIVATE LANDS											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	O	O	-	--	O	-	--	O	-	O

K. SOCIOECONOMICS

With the exception of energy development, the present uses of the public lands within the HMAs are quite interdependent since they all rely on the same mix of limited natural resources. These uses can all be optimized to varying degrees without adversely affecting other uses. For example, improved genetics in domestic livestock can improve the profitability of that endeavor without the increased consumption of any habitat component required for some other use. These uses can also compete with one another. For example, if livestock numbers were increased with positive effects to 20 livestock operators, the supply of wild meat available from licensed sport hunting might decline with negative effects to 100 individual families.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #1

Under this alternative the BLM would employ the practices and methods described in the supplemental program guidance and statewide gather plan to achieve and maintain AMLs in the Rawlins Field Office. AML’s would be attained in the year 2002 and maintained there after by the annual removal of horses, ages five and under. The social economic environmental consequences of this action would allow for the continuation of other resource uses at present levels. This would allow viable wild horse populations to reach established management levels, upon which removal would occur as wild horse numbers exceed established management levels.

The regional impacts from this alternative would be minor in the short-term, however,in the long term, the economy could be moderately affected.

The overall local social effects of this action would be minimal. Change to regional lifestyles and attitudes would be insignificant because most ranchers would continue operations much as they have before. It is expected that changes to the historical patterns of use in the area would be insignificant.

The proposed management levels of wild horses would allow for continued implementation of the related management actions from the GDRA Resource Management Plan. In the long term, the rangeland conditions of both upland and riparian areas would improve. In the short term, the rangeland conditions would be maintained or slightly increased depending on climatic conditions. This alternative would would allow the greatest opportunity for the Great Divide Resource Management Plan objectives for wild horse, wildlife, and livestock grazing to be met.

Wildlife species, both game and nongame, would be expected to be maintained or slightly increase in the long term. In economic terms, this maintenance of wildlife populations would represent maintenance of hunter revenues, both to the state and the communities. No data are available to indicate the exact amount of hunter days in the HMAs and therefore the economic significance of this impact.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #2

Under this alternative the BLM would not achieve or maintain AMLs in the HMAS in the Rawlins Field Office. The BLM would only employ the practices and methods described in the Wyoming Supplemental Handbook which would only allow for removal only under emergency conditions or in response to landowner requests. The social economic environmental consequences of this action would allow wild horses to exceed the recognized carrying capacity of the federal range and all domestic livestock grazing would have to be reduced to the point of possible elimination.

Adverse impacts would occur in those grazing allotments that are within or adjacent to the HMA’s. Removal or reduction of livestock grazing would have an impact to grazing management flexibility and opportunities. When livestock grazing are eliminated to accommodate the additional forage demand from the expanding wild horse populations, the following impacts would probably result.

Elimination of livestock use from all public lands within the herd areas would not have a significant adverse impact on the national livestock industry. However, it would cause significant impacts to the local economy and substantial increases in operational costs for the effected permittee, for example increased fence maintenance.

Livestock operators’ dependency on other lands would increase if they elected or were able to stay in the livestock business. Herding would be required to move sheep and cattle to leased private or state lands, and this leased property would have to be fenced to prevent livestock from straying onto public land and to prevent horses from consuming available forage desired for livestock production or resource’s protection.

Some operators would be affected less than others, but many would be forced to seek additional sources of income. Some would not be able to continue their ranching operations without the public land forage.

The impacts to the regional economy from this alternative would be substantial. There would be a loss of employment associated with the potential changes to livestock operations in the HMA's. Another impact would be the loss of property and sales tax revenues to the effected counties.

An important consideration under this alternative relates to wildlife and recreation values. The elimination or near elimination of livestock from public lands in these areas would not lead to more stabilized wildlife populations as the livestock use would be replaced by horse use which would be less intensively managed and regulated than the domestic livestock grazing that it replaced. In the long term, under this alternative, wildlife values would decline noticeably. The forage competition that would occur with wild horses on public lands would force wildlife to eventually migrate to private lands. No specific data are available for this area regarding number of angler or hunter days, recreation expenditures would be expected to remain stable for a time, then decrease to correlate with effects on the wildlife populations. In a region that is predominantly agrarian, this alternative would present significant social impacts, serious enough to change the traditional ranching lifestyle.

Cost of administration of this alternative to the BLM would remain high. Gathering expenses outside the HMA's or during emergency situations as emigration became a significant factor in the horses' attempt to adjust their populations and distributions to the available habitat.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #3

The effects of this alternative would be similar to the alternative # 2. Under this alternative the BLM would rely on predation and environmental forces to establish and Maintain self-regulating populations.
The social economic environmental consequences of this action would allow wild horses to exceed the recognized carrying capacity of the federal range and all domestic livestock grazing would have to be reduced to the point of possible elimination.

Adverse impacts would occur in those grazing allotments that are within or adjacent to the HMA's. Removal or reduction of livestock grazing would have an impact grazing management flexibility and opportunities. When livestock grazing is eliminated to accommodate the additional forage demand from the expanding wild horse populations, the following impacts would probably result.

Elimination of livestock use from all public lands within the herd areas would not have a significant adverse impact on the national livestock industry. However, it would cause significant impacts to the local economy and substantial increases in operational costs for the effected permittee, for example increased fence maintenance.

Livestock operators' dependency on other lands would increase if they elected or were able to stay in the livestock business. Herding would be required to move sheep and cattle to leased private or state lands, and this leased property would have to be fenced to prevent livestock from straying onto public land and to prevent horses from consuming available forage desired for livestock production or resource's protection.

Some operators would be affected less than others, but many would be forced to seek additional sources of income. Some would not be able to continue their ranching operations without the public land forage.

The impacts to the regional economy from this alternative would be substantial. There would be a loss of employment associated with the potential changes to livestock operations in the HMA's. Another impact would be the loss of property and sales tax revenues to the effected counties.

An important consideration under this alternative relates to wildlife and recreation values. The elimination or near elimination of livestock from public lands in these areas would not lead to more stabilized wildlife populations as the livestock use would be replaced by horse use which would be less intensively managed and regulated than the domestic livestock grazing that it replaced. In the long term, under this alternative, wildlife values would decline noticeably. The forage competition that would occur with wild horses on public lands would force wildlife to eventually migrate to private lands. No specific data are available for this area regarding number of angler or hunter days, recreation expenditures would be expected to remain stable for a time, then decrease to correlate with effects on the wildlife populations. In a region that is predominantly agrarian, this alternative would present significant social impacts, serious enough to change the traditional ranching lifestyle.

Managing for a naturally limiting wild horse population would not allow for continued implementation of management plans and management agreements. In the short-term, the conditions of uplands and riparian areas would decline. In the long term, the rangeland conditions would stabilize once wild horse populations stabilize. This alternative would allow the least opportunity for resource management objectives for wild horses, wildlife, recreation and livestock grazing.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE #4

Under this alternative the BLM would achieve and Maintain AMLS in Wyoming by the use of fertility control. In the short term, this action would allow for the wild horse population to expand. Under this alternative, horse populations would increase for the period necessary for reproductive suppression to achieve stable populations. Eventually, all populations would then decline. When AML levels are reached, fertility control methods would decrease in order to allow sufficient reproduction to maintain the populations at AML.

This alternative would be very costly to implement. The regional economic impacts from this alternative would be minor. The overall local social

effects of this alternative would be a short term increase in revenue from increased personal and equipment to implement fertility control. In the long term, as horse numbers decreased the revenue and cost to continue implementation would eventually decline and then stabilize as crews and equipment would be more predictable.

COMPARISON OF THE CONSEQUENCES OF THE ALTERNATIVES ON SOCIO ECONOMICS											
ALTERNATIVE #1			ALTERNATIVE #2			ALTERNATIVE #3			ALTERNATIVE #4		
IMD	ST	LT	IMD	ST	LT	IMD	ST	LT	IMD	ST	LT
O	O	+	O	-	-	O	-	--	O	O	O

COMPARATIVE DIRECT BUDGET REQUIREMENTS OF IMPLEMENTING THE ALTERNATIVES

ALTERNATIVE		#1		#2		#3		#4	
PRACTICE	UC*	HORSES	K$	HORSES	K$	HORSES	K$	HORSES	K$
GATHERING	244	10,000	2,440	9,000	2,196	0		26,000	6,344
PROCESSING	193	6,000	1,158	9,000	2,196	0		0	
ADOPTION	106	5,200	551	9,000	2,196	0		0	
TREATMENT	240#			0		0		11,000	2,640
TOTAL			4,149		6,588				8,984

NOTES

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Comparisons are derived from 20 year projections (FY 2000-2019) of the levels of activity as described for each alternative.
UC (Unit Costs) are from the FY 2000 Wyoming Budget submission and are not adjusted for inflation.

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Current estimated cost of administering a two year vaccine when it becomes available.

V. MITIGATIVE MEASURES

Each alternative incorporates mitigation measures that have been developed through experience with the practices included. For instance, whenever an alternative includes the use of traps to capture horses for any purpose, certain measures are routinely included. No new roads will be constructed to trap sites and no blading will be allowed for roads or two track trails. No blading will be allowed for wing construction or corral construction. Trap site selection will avoid sites where potential conflicts have been noted with other species or their habitat. Standard operating procedures include mitigation of adverse impacts that have been encountered. When soil conditions are wet enough to result in irreversible or long term damage,

operations will be suspended until conditions permit proper use.

No additional mitigation has been proposed. To propose additional mitigation for the probable impacts identified with each alternative would blur the distinctions between alternative management strategies and render the analysis moot.

VI. RESIDUAL IMPACTS

Residual Impacts are those that would be left over at the conclusion of a particular course of action and that could not be avoided or further mitigated. As no additional mitigation is proposed beyond that which would be inherent in a particular course of action, all of the impacts from a particular course of action identified would be residual. The degree of severity of a residual impact is often a function of time. To illustrate, moderate overutilization of a forage plant for a short period of time has little or no residual impact as a change in the level of use can be made before the forage plant's productive potential is reduced. Extended periods of moderate overutilization, on the other hand, will eventually reduce the productive potential of that plant and thus a residual impact (reduced production) would accrue after a time.

VII. CUMULATIVE IMPACTS

None of the HMAs in the Rawlins Field Office are designated wild horse ranges. All of the HMAs contain a variety of resources and support a variety of uses. There are a number of other BLM conducted and authorized activities ongoing in and adjacent to the HMAs. Any alternative course of wild horse management has the opportunity affect and be affected by those activities. Most of those activities depend in one way or another on the maintenance of a healthy landscape. Further, wild horses are not unique to the Rawlins Field Office. Thus the impacts of a course of action pursued within the RFO may have effects on the national population or the well-being of the species as a whole. The following tables represent the probable cumulative impacts of the alternatives analyzed.

A. ALTERNATIVE #1

CUMULATIVE IMPACTS OF THE ALTERNATIVE ON:		
NATIONAL POPULATION	**NATURAL* ECOLOGICAL BALANCE**	**MULTIPLE USE* RELATIONSHIP**
Stabilizing	Maintained	Preserved

*In the HMAs in the Rawlins Field Office

B. ALTERNATIVE #2

CUMULATIVE IMPACTS OF THE ALTERNATIVE ON:		
NATIONAL POPULATION	**NATURAL* ECOLOGICAL BALANCE**	**MULTIPLE USE* RELATIONSHIP**
Destabilizing	Not Maintained	Not Preserved

*In the HMAs in the Rawlins Field Office

C. ALTERNATIVE #3

CUMULATIVE IMPACTS OF THE ALTERNATIVE ON:		
NATIONAL POPULATION	**NATURAL* ECOLOGICAL BALANCE**	**MULTIPLE USE* RELATIONSHIP**
Destabilizing	Not Maintained	Not Preserved

*In the HMAs in the Rawlins Field Office

D. ALTERNATIVE #4

CUMULATIVE IMPACTS OF THE ALTERNATIVE ON:		
NATIONAL POPULATION	**NATURAL* ECOLOGICAL BALANCE**	**MULTIPLE USE* RELATIONSHIP**
Slight Increase	Maintained	Preserved

*In the HMAs in the Rawlins Field Office

VIII. CONSULTATION AND COORDINATION

A. INTRODUCTION

The Bureau of Land Management is responsible for obtaining public input on proposed actions within the wild horse program. Public input has been solicited for several discrete actions proposed over the last few years.

In addition, a formal statewide hearing regarding the use of helicopters for the roundup of wild horses in Wyoming is held each year. The public is provided an opportunity to discuss concerns and questions with BLM staff.

EAs have been prepared which analyzed the effects of individual population management actions on specific populations of wild horses. In preparing those analyses in 1999, interested publics were contacted and asked to identify issues of concern for inclusion in the analyses. Some of those concerns identified were beyond the scope of the analysis of the particular actions at the time they were proposed. This EA has been structured to attempt to address those additional concerns.

Recently, the Rawlins and Lander Field Offices completed a maintenance of their respective land use plans. As part of that action, input was solicited for this analysis and updated mailing lists were developed.

B. DISTRIBUTION

This environmental assessment will be provided to all wild horse interest groups on the Rawlins Field Office mailing list, livestock interest groups, individual livestock owners who operate in the HMAs, the Wyoming Game and Fish Department, wildlife interest groups, and interested individuals who have requested it. The updated mailing list referred to above will form the basis of this distribution. The Handbook is available for inspection in the Rawlins Field Office during regular business hours.

C. LIST OF PREPARERS

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APPENDIX A
POPULATION MANAGEMENT CONSIDERATIONS/AN ANALYSIS OF ALTERNATIVE MANAGEMENT

Background
Effective and responsible management of wild, free roaming horses on public lands in Wyoming requires careful consideration of the interaction of factors in three equally complex areas. They are:

1.The determination of Appropriate Management Levels for each herd; and,
2.The identification of safe, humane, and efficient methods of operation; and,
3.The careful consideration of the long-term effects of available management strategies on the health and viability of the herds, on the range.

#1 is addressed herd by herd, area by area. The AML for each herd is developed in close concert with the other authorized uses of the area.

#2 is addressed in Statewide and individual Gather Plans. This analysis can supplement that process by providing the means for comparing numbers of animals gathered, removed, treated, etc, under various alternatives.

#3 is the focus of this analysis.

Introduction
Individual Herd Management Area Plans for individual herds will develop specific population management strategies for the specific herds. These specific strategies must consider two realities. Those are the very real constraints provided by adoption demand and policy and the biological considerations of various management strategies. Each necessarily constrains the other. Both must react to budgetary conditions at varying times during the life of a decision. In the end, what the authorized officer decides to do with respect to management of a particular population of horses may appear to be less than perfect from either the biological, adoption demand, or operational perspective but will balance all these considerations.

Analysis considerations
The population model developed for the BLM by Dr Stephen Jenkins is employed to compare the most probable outcomes of alternate strategies in order to enable the selection of specific population management strategies for specific herds. At best, any model can predict less than perfectly. Dr Jenkins' model provides for multiple trials of an alternate strategy and subsequent comparison of most likely outcomes. Any reliable model depends upon accurate inputs for reliable projections. Such necessary inputs as individual survivability, individual foaling rates and coefficients of variation must be garnered from the best available sources. Fortunately, the value of modeling is in comparing the probable effects of alternate strategies and not in absolute prediction so less than perfect data is still useful. Data for the analysis is provided by Dr Jenkins and modified based on local experience from analysis of historic gather data from WHBIS.

In order to complete the necessary comparisons, a typical population was employed for all analysis. This typical population consisted of 100 adults +

the young of the year. As would be characteristic of Wyoming management, this herd has a lower limit of 80 adults and an upper limit of 120 adults. Logistically, it is the aim of Wyoming BLM to pursue a three year statewide gather cycle. In effect this would mean that whatever the management strategy selected for a herd was, it would be implemented every third year on a predictable rotating basis. Emergency situations would still be expected to arise and would add to, rather than take the place of regular population management activities.

The most fundamental of assumptions is this: The establisment of an AML includes the responsibility for the expenditure of reasonable effort to achieve and maintain it. Since horses are long-lived, reproductively successful, and quite competitive with other grazers and predators that share their habitats, periodic roundups and removals are necessary in order to meet this responsibility.

The decision to remove horses from the range is fraught with complexity and controversy. Which horses and how many should be removed and how should this be accomplished? Thus we are brought full circle back to our point of beginning with the three complex areas to consider.

Areas of Analysis

In the consideration of the third point above, The careful consideration of the long-term effects of available management strategies on the health and viability of the herds, on the range the two primary tools associated with removals must be addressed. They are: Selective Removal and Fertility Control.

Selective Removal

The Strategic Plan for the Management of Wild, Free Roaming Horses and Burros on Public Lands developed in 1992, among other things, established the policy of Selective Removal. The policy states that the BLM will only remove animals from the range for which an adoption demand exists. It does not preclude the emergency removal of unadoptable animals and it does not define adoptability but leaves it up to the BLM to adjust that periodically to reflect current and regional adoption demands. The Selective Removal policy was helpful in bringing about an end to a number of practices which had troubled the BLM and the interested public such as sanctuaries, feedlots, fee waiver adoptions, and related things made necessary in order to deal with large numbers of difficult to adopt horses removed from the public lands. One stated intent of the policy was to make additional funds available for on the ground management rather than requiring them for the long term maintenance of horses in facilities. In terms of eliminating long term maintenance of unadoptable horses, the policy has been successful. It is not, however, completely benign. The long term application of selective removal in the management of any given population will result in a different age and sex distribution for that population than would have resulted if removals had been conducted differently. In addition, applying the policy in a short term setting and only considering adoption demand can result in different selection criteria than might result if the long term effects of alternate selective criteria on herd health and viability are given primary consideration. It is usually

desirable to have herd specific versions of the Selective Removal criteria which consider herd health requirements within the larger context of what can be handled within the adoption program. Such specific criteria can be helpful in determining needs and priorities for special resources which may be made available such as training or specialized, targeted adoption efforts. Thus it is prudent to predict the long term effect of various selection criteria on various types of herds in order to enable the decision makers to make the best decisions available to them within the constraints at hand.

Strictly speaking, anything other than strictly random removals would be 'selective removal'. Although the practice is primarily viewed as an adoption demand driven practice, it could be modified and implemented locally to accomplish specific herd management objectives within the constraints of adoption demand. E.G., for a period of time, only adoptable males could be removed from a population in order to increase the percentage of females in the total population. Such a practice could be further modified if necessary. In any case, the probable long term implications of any localizing of selective removal criteria should be thoroughly evaluated utilizing the population modeling and comparing predicted effects. It is quite conceivable that, upon reaching AML for a given population, simple changes in such things as sex ratio could have significant impact on the long term viability of a particular population at a particular place at a particular level.

Fertility Control

The term fertility control can be used to describe a wide range of practices which would eliminate or constrain reproduction and related population increases in a target population of animals.

Assumptions

All the analysis share the following assumptions: 10 to 20% of the population will evade capture and treatment. That percentage will be randomly distributed as to age and sex. Of the mares treated, 5% will not exhibit the desired response and will remain fertile. The net effect of this will be some reproduction, even with a vaccine that is effective in preventing three pregnancies and administered every third year. All comparisons were drawn from the results of nine trials, each for a period of twenty years. Means that were within 95% confidence intervals were computed for most significant results Lows and highs that fell outside these limits were noted as possible predictors of potential catastrophes. Means were compared to means, maximums to maximums, minimums to minimums, etc. The model does not directly incorporate any factors of density dependance. As each event internal to operation of the model is computed randomly, the results will rarely mimic simple mathematical projections but may mimic some density dependant factors. One purpose well served by this is that for each average outcome that is predicted, one can see the extremes that could possibly be encountered in arriving at the long term average.

Further, the model and these analysis assume that important behaviors would be unaffected by the use of any fertility control strategy. The analysis only addresses the effects of selected strategies on fundamental elements of the population such as number, sex ratio, age distribution, etc. It must be noted

that different fertility control agents could be expected to have differing effects on behavior due to the different ways in which they achieve the desired result which is suppression of reproductive success. There is not sufficient experience with the various methods in order to be able to predict behavioral responses to alternate strategies. Based on the high degree of variability in observed rates of increase among horse populations, it is reasonable to predict that the suppression of reproductive success to some unknown degree through artificial means can be tolerated by most wild horse populations. It would be reasonable to make the initial decisions regarding fertility control based on the current knowledge. Any such decision, however should be continually reevaluated based on the most current observations. E.G. It could prove to be a responsible decision to employ fertility control in Herd Y. Annual monitoring of the effects of the practice could then yield results which would indicate that further use would not be in the best interest of the long term viability of Herd Y. Conversely, current information could yield the decision not to employ fertility control as part of the strategy for Herd Z but then further developments could change that decision as well.

COMPARISON OF ALTERNATIVE POPULATION MANAGEMENT STRATEGIES

Baseline

First, a baseline was developed which incorporated two basic tenets of policy. They were that only horses five and under would be placed in the adoption program and that the three year cycle would be employed. Further, in developing the baseline, equal numbers of each sex were removed. A comparison was made with making the removals random rather than age specific. Neither strategy alone, was successful in maintaining the average population at the AML of 100 animals plus the young of the year. Each, however, saw minimums and maximums within the range of acceptability. These served to illustrate that no formula can serve on a long term basis to achieve population objectives without periodic adjustment. The baseline did not change the sex ratio and therefore would not effect general determinations of a minimum viable population. The age specific removal resulted in growth rates slightly higher and less variable than the random removals. Removing only the youngest horses actually favors the age class of mares that are most successful at weaning young on a regular basis. After twenty years of age selective removals, the age distribution shifted from the initial distribution with a concentration of 3 year old and younger horses, smaller numbers of 4-9 year olds and then slightly increasing numbers of 10 and older. As the time under the strategy increased, the age distribution became more like the initial distribution, overcoming initial shifts toward a markedly increased average age.

Selective Removal strategies

While it was not feasible to try to compare every possible permutation of the basic premise, it was possible to compare the effects of significantly different strategies. From this, trends or directions can be inferred and the possible effects of more subtle variations understood.

Since adoption demand is often stronger for females than for males, the

effects of removing unequal numbers of males and females were compared. In either case (removing more males or removing more females) the resultant sex ratios responded as would be expected. Removing more males increased the percentage of females in the population and removing more females increased the percentage of males in the population. Either scenario could require a reevaluation of the determination of MVP for a particular herd. Given the polygamous nature of horses, removing significantly more females than males should be avoided. Removing larger numbers of females was slightly less successful at maintaining the average population at AML and exhibited noticeably more variability. Removing greater numbers of females produced lower rates of increase than when more males were removed. The differences were significant. Removing more males than females produced an almost 50% increase in the number of horses placed in the adoption program than when more females than males were removed. Increasing the age for removal to 9 and under and removing equal numbers of both sexes produced results comparable to the baseline conditions. From this it could be inferred that periodic adjustments to the age selection criteria, alone, would not be expected to materially change the composition of a herd.

The question of the effect of selective removal on the rate of attainment of reaching AML from population levels of twice, three times, and four times AML by removing equal numbers of both sexes was also examined. Beginning populations of twice AML did not appear to pose special concerns either to habitat or animal health. But beginning at three times and increasing toward four times AML, both habitat and animal health issues could be predicted. Average population size was above AML proportionately more and for a proportionately longer period as the initial population increases. In addition, variability increases and with it vulnerability to environmental stress. Then, the results of reaching AML from an initial population level of four times and removing equal and unequal numbers of both sexes were compared. Removing more females than males exacerbated all the negative effects previously observed and added some concerns about MVP.

A strategy of removing males only, with and without fertility control was examined. While it was clearly ineffective in maintaining the population over the long term, it could be a very effective tool for use for one or two gather cycles in order to increase the percentage of females in the overall population. This in turn could optimize the percentage of adults participating in the breeding population or restore a balance lost during a period of low adoption demand for male horses.

Fertility Control Strategies

As with selective removal, a variety of strategies were compared. First, a strategy was evaluated which employed fertility control alone with no removals. A three year effectiveness was assumed. This, however, was evaluated on a thirty year basis. First, it must be noted that this strategy was completely unsuccessful at maintaining the population within AML. While the growth rate was reduced to almost nothing, there was still some reproductive activity. The population appeared to trend steadily upward for 25 years and then become nearly stable at nearly twice the AML. More importantly, the minimums and maximums experienced under this scenario were

most variable and troubling. Minimums were dangerously low with some less than 50 and maximums approached or exceeded three times AML. This scenario was the most gather intensive of all examined and though no horses were placed in the adoption program, large numbers were gathered and handled in order to employ this strategy. Resultant age distribution was more changed from the initial than under any other strategy.

Next, the effects of identical applications of fertility control with one year, two year, and three year effectiveness coupled with the selective removal of equal numbers of males and females ages five and under were compared. As might be expected, the effects on the age distribution were least with one year duration and most with three year. All three were equally effective in controlling the population within acceptable limits and variations with the two year duration being the best. None of the three had a significant effect on the sex ratio of the population. Growth rate decreased as treatment duration increased but was most variable at the one year duration. Horses removed and treated varied only slightly among the alternatives The total cost of operation would be less with a three year vaccine than with a two but only slightly so.

While a three year vaccine is not currently anticipated, inclusion of a three year effacacy in the analysis provided useful comparisons.

CONCLUSIONS

As long as adoption is the only means available for the disposal of excess horses and as long as the control of populations through PMAs remains the primary tool for achievement of healthy, viable herds and habitats, individual removal decisions are important to the long term health of the land and the horses.

In order to responsibly carry out management of the horses and their habitats, two things are essential.

The first is a clear long term vision of the desired future composition of the herd and the implications of that to the health and viability of the horses. That vision must be free to change with changing science, adoption demand, public demands, competing uses, etc.

The second essential item is a clear and abiding committment to continually review each individual management decision and the results it produces against that vision and the willingness to adjust based on observed results.

Decisions to implement practices such as fertility control or herd specific selective removal criteria can be made utilizing that long term vision but they must be regularly reevaluated.

Further, it can be seen that the bulk of benefits that would accrue to more effective fertility control delivery systems would be realized with a two year vaccine and that further emphasis on the development of a three year vaccine would be unwarranted. The use of fertility control with a two year duration

in a three year gather cycle, may provide an optimum mix of reproductive suppression and reproductive success to maintain desired herd characteristics.

APPENDIX B
SPRING ROUNDUPS IN WYOMING (February 15th to April 15th)

CURRENT PRACTICE

HISTORY OF CURRENT PRACTICE

Current practices in Wyoming developed during the period of 1978-87 and have remained constant since then.

Extensive studies were conducted under the leadership of Richard Miller and Dr R.H. Denniston. One of those studies addressed natality, foal survivorship, and mare-foal behavior. The results of this study were submitted as a Master's thesis by Lee E. Boyd to the University of Wyoming in August of 1980. Results of the field studies in 1978 and 1979 were immediately available to BLM personnel and proved quite helpful in fine tuning practices to insure that the needs of pregnant mares and very young foals were considered in the development of policy governing roundups in Wyoming. Formalization of these considerations in 1988 reflected the underlying studies and subsequent years of experience.

Renewed attention to this issue in 1998 resulted in a thorough review of both the establishment of current practices (1978-87) and the experience gained in following those practices (1988-96). This document revisited that review and incorporated 1997, 1998, and 1999 experience into that review.

CURRENT PRACTICE VIS A VIS PREGNANT MARES AND VERY YOUNG FOALS

Except for emergency situations that may develop and landowner requests, no removals that employ a helicopter as part of the capture technique will be scheduled prior to February 15 nor between April 1st and July 4th of any calendar year. And Further: When removals are conducted during the period of February 15 to April 1st, the following practices are employed on a daily basis. Daily determinations are the responsibility of the BLM. (The helicopter services are managed on a per hour, seasonal basis rather than any per head configuration and the helicopter pilot has no overriding economic or contractual interest that would operate to prevent sound daily decision making.)

1. Helicopter operation will be stopped and either suspended or relocated if significant numbers of newborn colts are encountered.
2. Mares, when encountered, will be allowed to set their own pace in approaching the trap site.
3. Bands or individuals will not be required to travel long distances across muddy terrain in order to avoid increasing the stress levels associated with gathering.
4. Presence of heavy mares and pre-foaling behavior may require additional separation, smaller loads and additional trips while transporting horses from the capture site to the processing facility in order to be responsive to those needs.
5. Removals scheduled and begun prior to April 1 may continue past April 1 to completion providing all the above criteria are adhered to.

And Further: when removals are conducted after July 4th the following practices are employed on a daily basis:

1. Mares with very young colts will be allowed to drop out and remain with their colts if they attempt to do so.
2. The pace of a band being brought to a trap site will be controlled to avoid separation of mothers from their young if possible, regardless of age.
3. If mares abandon colts to keep up with the band, wranglers will be notified and the colts will receive the individual attention necessary to insure that they are not permanently separated from their mothers. Generally, it will be preferred to capture the colt and reunite it with its mother rather than try to separate the mother from the band.

CURRENT VS FUTURE CONDITIONS

Practices, to date, have developed and been employed in response to an over population of wild horses in Wyoming. The total Appropriate Management Level (population objective) for 15 herds is now 3093 horses. That level has remained essentially constant since 1978. Each individual AML has been reviewed to insure that it is legally correct and supported by current monitoring data. During this same period, the actual population in Wyoming has fluctuated between 4,000 and over 9,000. The current population is estimated at nearly 6,000 head. That fluctuation has been influenced by a variety of factors. Wyoming BLM long term goals for wild horse management include attaining and maintaining that combination of Appropriate management Levels. Attainment and maintenance of that objective population will have several positive effects on the horses and their habitat. Among those positive effects will be a minimal annual number of excess horses and a corresponding minimal need for removals and corresponding greater flexibility than currently exists in scheduling and completing the necessary number of removals. This increased flexibility will, among other things, afford the opportunity to avoid scheduling any removals during the sensitive period now known as Spring. Until that AML and its associated advantages are realized, it is necessary to balance a greater number of needs and the scheduling of a certain number of roundups during the spring period is one of those greater needs that, when taken together, insure the long term well being of the wild, free roaming horses in Wyoming and their habitat.

ANALYSIS OF CURRENT PRACTICE

In order to determine the observed and probable effects of the practices described previously on wild, free roaming horses in Wyoming, the following data were utilized.

FOALING DATA

Foaling data utilized consists of two parts. The first part is the result of the field studies in 1978, 1979. The second part consists of data from the Wild Horse and Burro Information System (WHBIS) which is a BLM wide system maintained by NARSC in Denver. WHBIS data is available from 1985 to present and can be readily interpreted to facilitate review of current practices. These data are summarized as follows:

Field Studies

FIELD STUDIES 1978, 1979
120 births observed in 1978
107 births observed in 1979
In 1978:
85% born between May 14th and June 30th.
12% born between July 1st and September 15th.
3% born between September 16th and May 13th.
In 1979:
5% born between April 6th and April 20th.
5% born between April 21st and May 1st.
45% born in May
32% born in June
6% born in July
4% born in August and September.
Of these 227 colts born in the wild during the study period, 22 died before weaning for a survival rate of 91.4%
Foaling rates were quite variable from year to year and amongst age classes. Averages for mares 3 and older ranged from 53 to 78 % and from 25% for three year olds to 100% for 8 year olds.

WHBIS Data
PEN STUDIES 1997, 1998, 1999 review of data from 1986-1998

For this part of the review, data on foals born in the BLM facilities were analyzed to determine if foaling patterns over time remained consistent with those observed in the field studies and used as the basis for establishing current practices.
In 1987, 1990, 1993, 1994, 1995, and 1998, no spring gathers were conducted, however there were mares carried over in the corrals in 1998 and 1994 from gathers in the preceding fall that foaled and that data was also analyzed (25 births)

During that period (1986-1998), a total of 302 colts were born in the Rock Springs and Riverton corrals. 290 (96%) of those were born between April 15th and June 30th and 85% (257) were born after May 14th. 22 of these colts died before they were adopted for a survival rate of 93% which is higher but not statistically different than that documented in the wild. The total number of mares removed at the same times and places as those 302 that foaled after capture was 804 for a foaling rate of 37.5 % for the period among that sample population. That is within the range of documented foaling rates for free roaming populations, however, no significant conclusions can be drawn from that comparison as factors affecting observed foaling rates are so variable as to render any attempted comparisons speculative, at best. It should also be noted that the field studies comprised statistically valid samples of a total population while the pen studies may not as the areas and animals targeted for removal were selected for other reasons and the age, sex, and foaling data were collected subsequently. The rates for individual years ranged between 25.2% and 85.9%. They were above 50% in 57% of the years analyzed.

The field studies were conducted in the Red Desert Area. The pen studies involve only mares gathered from the Red Desert and areas to the south of it

as no gathers have been conducted in the Spring season in any of the herds in Wyoming that occupy areas north of the Great Divide Basin which contains the Red Desert.

MARE DATA

Statistical data on mares is contained within that cited above for foals. It was apparent that since pregnant mares produce foals and barren ones do not that separate data (E.G. serum hormone levels, ultrasound, palpation, etc.) on conception rates, presence/absence, progression of pregnancies, etc in the mares was neither cost effective nor necessary in order to review and evaluate past and current practices and their probable effect on the mares. In addition, consultation from veterinarians was sought regarding the physiological and endocrinological characteristics and needs of mares in various stages of pregnancy. From these data and consultations it was confirmed that avoiding unaccustomed stress after the onset of the 38th week of pregnancy was an appropriate safeguard to avoid stress induced abortion during removal and processing and determined that shutting down gathering activities between April 1st and July 4th was effective in avoiding subjecting mares to unaccustomed stress after their 38th week of pregnancy at least 85% of the time. It was further determined that the only way to avoid with absolute certainty the possibility that any pregnant mare would ever be subjected to any unaccustomed stress was to never remove any group of horses which might contain a pregnant mare which would, in effect, make it essentially impossible to ever schedule and complete any removal and in so doing subvert the well-being of the entire herd and its habitat to the perceived need of one or a few individuals who may not even exist and who, at best, would prove difficult to identify.

RELATIONSHIP OF FOALING ACTIVITY TO OTHER FACTORS

The gestation period for horses is eleven months. Very healthy mares may breed back as soon as eight days after foaling. More typically, wild mares will breed back in the next heat cycle which would be 36 days after foaling for most. Mares that are fertile but did not carry a foal to term may begin their heat cycles and therefore their receptiveness to breeding as early as March or as late as August, depending on a variety of factors. Forage conditions, photo period, lactation, and social factors can all influence heat cycles and breeding activity and thus conception in any given year which, in turn, influences foaling in the subsequent year. In addition, it appears to be somewhat common for wild mares that have not carried a foal to term to experience one or more anestrous cycles prior to conception. An anestrous cycle is one wherein the mare becomes receptive to breeding but is not fertile and cannot, therefore, conceive until a later cycle. This may be caused by the interaction of photo period and physical condition of the mares. Since, in most years, the majority of the breeding aged mares in the population will have delivered a foal by June 15th, the fluctuation in the foaling period from year to year is not as great as might be expected. Gather operations are more labor intensive as the number of young foals increases since young foals receive special attention at multiple points along the way from the range to the adoption. If a gather can be scheduled and completed prior to the birth of most foals, potential negative impact to young foals can be reduced.

SUMMARY AND CONCLUSIONS

It is currently the policy of Wyoming BLM to refrain from scheduling and conducting regular Wild Horse gathering operations during the period that could be expected to cause stress and trauma to significant numbers of pregnant females and very young colts. Experience has indicated that mares in their eleventh month of pregnancy and colts younger than one month may suffer injury when subjected to the stresses associated with gathering and processing. Thus comes the need to identify a "window" or period of time in which to refrain from scheduling and conducting regular gathering operations. This "window" needs to cover the period beginning when significant numbers of mares begin to enter their eleventh month of pregnancy and ending when most colts are older than one month. Gathers must be scheduled in advance and coordination amongst gathering operations is important; further, visual observations of wild animals is not a reliable method for identifying stages of pregnancy. The historic practice (beginning in 1989) has been to suspend all gathering during the 12 week period of April 1 to July 1. Field studies conducted in 1978 and 1979 and subsequent experience were employed to identify this period. Boyd stated in 1980, "The main foaling season (in the Red Desert) is from late March through July with a peak in May and June, however, a few foals are born at other times of the year." Logistical and practical considerations have extended that period until after the fourth of July holiday week which can be as early as July 7 or as late as July 12. This has left the period before April 1 for the completion of any planned spring roundups. This period was chosen to reflect the experience that had been gained in previous years when gathering was conducted during this period. In most herds in Wyoming, environmental factors preclude scheduling gathers during the late winter and/or early spring period because of the high likelihood of experiencing adverse weather conditions which can increase the danger to both the horses and the gathering crew as well as present many operational complications (mud, wind, etc). For those few herds where weather conditions would ordinarily permit some gathering activity during the late winter/early spring period in some years, identification of the "window" is necessary in order to be able to plan, in advance, the latest date(s) on which to be able to conduct gathering operations without risking the health of pregnant mares and unborn or very young colts. The current policy of not conducting gathering operations from April 1 to post July 4 has, in effect, eliminated regularly scheduled early gathering from even being considered in 8 of the 15 herds in the state due to environmental considerations.

This analysis of 10 years of historical data was conducted to determine if the existing policy of not gathering between April 1 and July fourth would adequately insure the health of the herds in the future when it proved necessary to schedule regular gathering operations in the spring or pre-foaling period until Appropriate Management Levels are reached for all herds in the state. Further, this analysis will be used to determine what the appropriate periods of time will be for the scheduling of regular gathering to maintain AMLs once they are achieved.

DATA SOURCE

Data for this analysis were derived from the Wild Horse and Burro Information System which is maintained in Denver, Colorado. Every horse removed from the public lands is entered into this system, prior to being made available for adoption. Colts born in captivity are also entered. Much information about each horse is recorded. Among that, and utilized in this analysis is date captured (or born if born in captivity), sex, age, and herd. Any animal that dies in captivity is also recorded.

METHOD OF ANALYSIS

Data for all animals captured in a given year were reviewed. All mares 2 years of age and older captured before the April 1 shutdown were identified. Then the birth dates of all foals born in captivity to those mares until the resumption of gathering after the fourth of July were noted and plotted.

CONCLUSIONS OF ANALYSIS

From this it was possible to determine if foaling patterns in the wild thru time (periods) remained consistent with those documented in field studies and forming the basis for current policy. That analysis determined that the traditional "spring shutdown" was quite responsive to the needs of the pregnant mares and young foals. The April 1- post July 4th period instituted in 1989 accommodated the peak of foaling in the next 9 years. In none of the years for which data was analyzed did it appear that the shutdown missed the peak significantly and resulted in gathering activities at inappropriate times. Variations in the occurrence of the peak probably rendered it less responsive in some years than others. Boyd (1980) actually found that gathers conducted earlier (before April 1) resulted in better long term survival rates for both foals and mares though the sample size and duration of his analysis preclude drawing any significant conclusions other than to say that experience would definitely NOT indicate that gathering before the foaling season should be avoided for humane reasons.

POLICY CONSIDERATIONS

Since the question of whether or not to schedule and conduct removals in the February-March period can be neither affirmed nor denied with a simple mathematical computation, it must still be answered from a collection of all available and pertinent facts.

The foremost policy consideration to be addressed is should/could gathers be scheduled at all in the spring time in Wyoming? The answer to that question is a function of another, more fundamental question which is, "What are the values to be attained by reaching and maintaining the AML of 3093 horses for Wyoming?" As one goes down the list of positive reasons to be gleaned primarily from the resource data monitoring and analysis that resulted in those AMLs, an important logistical consideration emerges. That is that when Wyoming populations are significantly above the 3,000 level, the amount of gathering necessary to keep up with the annual increase increases. Not only are larger total numbers indicated but more herds must be gathered each year. Given the assumption that there will be only one crew in operation at any one time and the limitation imposed by the facility capacities, the conclusion is rather straightforward and it is this: Maintaining a population of 3,093 horses in Wyoming can be accomplished by removing about 600 horses per year. This, in turn can be accomplished by scheduling all regular gathering

operations after July 15th and up until the advent of adverse weather conditions in the fall. Conversely, populations significantly larger than 3,000 would require the scheduling of regular gathering in the spring time period.

It will doubtless prove more efficient to simply not schedule these early gathers and thus be able to rely on after the fact kinds of observations on foaling activity rather than expend the time and amount of effort required to accumulate the predictive kinds of data that would be required. Emergency gathers and removals of horses from areas outside of HMAs would still be considered on a case by case basis and could, if circumstances warranted, be scheduled before the July "safe" date. If the purpose of the gather could not be reasonably accomplished by rescheduling, then indicated precautions could be planned and taken in order to be able to complete the removal during this period.

Further then, is the question concerning the existing practices. Are they necessary and responsible? The answer to both parts of the question is yes as can be seen from the analysis presented and other relevant information.

First, of course, is that it is indeed necessary to schedule some regular gathering in the spring period until AMLs are achieved in Wyoming. It is not desirable nor feasible to utilize contract gathering services for a portion of the activity. The capacity of existing facilities will not support multiple gathering and it would not be cost effective to construct additional facilities for use for only a few years. Next, is that the current practices are responsible. The analysis of historical data supports that the current practices have developed in response to observed conditions and do not result in significant stress to pregnant mares and very young colts.

In conclusion, the current practice of not scheduling regular gathers during the 12 week period of April 1 until after the fourth of July holiday week which can be as early as July 7 or as late as July 12 is adequate to protect the health and welfare of the horses in Wyoming. Further, this policy can be modified to preclude all scheduled gathering prior to July 15th when all herds in the State have reached AML. One distinct advantage to this would be that regular monitoring of foaling activity would not be required for any of the herds in Wyoming once AMLs were achieved as the determination would have already been made to avoid the period of time during which extra precaution must be exercised. Required monitoring could be responsibly limited to observations of the percentage of foals gathered that appeared to be less than one month old. Should a particular herd be observed to exhibit a later peak period as evidenced by significant numbers of very young colts still being in evidence in July, that could be considered in further delaying the scheduling of maintenance gathers for that herd until a later time of the year.

Veterinary Opinions

> We spoke to Dr. Don Bosman, Wyoming State Veterinarian on 3/5/98 and asked him what the affect of running 7 to 10 miles at an easy lope on a late term pregnant mare would be. His response was: paraphrasing; the

only way you can assess it is by past experience and whether what you are proposing to do is different from what you have done in the past. He said it depends on many factors some of which are the mares weight, condition, type of soil, terrain, air temperature etc. He said a wild horse's normal day to day life conditions them for running, and it would be nothing for them to run 4 miles just for fun. He cited as an example his own horses which he said he observed the other day run around the section (4 miles) where he keeps them just for fun, and there are a couple of mares that are 1 month away from foaling in the bunch.

On Jan 19, 1999, Dr Werner MacFarland, DVM of Rawlins, was interviewed. Dr MacFarland's private practice includes a growing area of concentration in equine reproduction. The following points represent a summary of that interview:

*Among domestic horses, stress induced abortion is far more common in the first trimester than in the last. Late term (last trimester) abortions are far more common in the last 30-40 days of pregnancy than before that.

*Stress induced abortions are the result of elevated blood serum levels of cortisol. The fetus, in utero, when subjected to unaccustomed levels of stress (including but not limited to extreme fatigue resulting in oxygen deprivation) can trigger these elevated levels with accompanying adverse consequences.

*Unaccustomed stress is a relative, individualized thing. It follows the domestic experience that wild Equids would be naturally accustomed to relatively high levels of flight and fear induced responses which would rise to unaccustomed levels for domestic animals but not have corresponding adverse effects on wild equids.

*Higher fitness levels, particularly cardio vascular fitness decrease vulnerability to changes in stress levels and subsequently promote easier deliveries and quicker post natal recoveries. Wild equids would typically be expected to exhibit higher levels of cardio vascular fitness than domestic horses.

*Estrous in horses is heavily influenced by photo period and more particularly by lengthening daylight periods approaching the longest days of late June. This relationship supports the observations of concentrations of foaling activity in mid to late may.

*Visual indicators of impending parturition which can be observed through binoculars, (bagging, waxing, ventral edema, abdominal distension) are limited to the identification of the latest stages of pregnancy (last 15-30 days) and cannot be relied upon to separate pregnant from barren mares prior to the onset of the last 15-30 days of pregnancy.

Further information on the gestation period in mares was gleaned from a book by Ruth B James.
Most mares have a gestation period around 11 months. However, they can give birth to a normal, full term foal anytime between 10 and 12 months. Most mares go somewhere between 320 and 345 days. Using 11 months for a gestation

period will give a very close estimate of due date for most mares. The length of gestation has little to do with size of the foal.
Ruth B. James, DVM

1999 ADDENDUM

Some field observations in the spring/early summer time period of 1999 were made to test the validity of the foregoing assumptions. In conjunction with other activities, the total numbers of adult (>1 yr) horses, the total number and approximate age of colts, and the date of the observation were recorded throughout the period of April/May/June. Actual births were not recorded but rather the presence of a foal with a band was noted. Thus the differentiation between colts recently born and those born anytime since last fall. The purpose was to determine if births were concentrated during any period and, if so, when that period was. Observations for the entire day within an HMA were totaled and the results calculated as the percentage of foaling observed for the entire population as of that date.

A few colts were present as early as April 1, apparently having been born at various times since february. The actual percentage was less than 2% of the population. During the month of April and the first two weeks of May, a few births occurred with the total reaching about 6% by May 10. Then foaling activity increased dramatically with numerous births occurring between May 11 and June 3. By June 3, the percentage of foaling was > 20% for the observed populations. After June 3, some foaling activity continued throughout the remainder of the season until the approximate total of 26% was reached in late June.

In addition, careful attention was given to the apparent ages of colts captured in gathers conducted between July 15 and July 27, 1999. This population was the same population that was proposed for gathering during the period of February 15th to March 31st, 1999. These horses were outside of and adjacent to the Adobe Town HMA. Sampling consisted of daily observation and recordation of the apparent ages of foals captured that day.

From these observations, it could be observed that of 87 colts captured during the period, 13 or 15% had been born prior to April 1. 66 or 76% had been born between May 15th and July 1st. 8 or 9% were born between July 1st and the date they were captured. Four of these were afforded extra attention. Subsequent to capture 3 mares foaled in captivity. No colts were injured enough to require treatment. From this it can be seen that >85% of mares that eventually foaled would have been at least six weeks from foaling on April 1st when gathering operations would have been suspended under the original proposed removals. Of the colts present during the month of March, about seven would have been two weeks of age or younger and could have required some special attention.

After July 27th, only the presence of very young foals was noted. Colts less than one month old (born after July 27th) were encountered occasionally until the removal action ended on August 26th, though never in concentrations which necessitated any deviation from normal operating procedures which incorporate

multiple trap sites, cessation of operations by late morning, and the use of sufficient experienced personnel to be able to keep track of the foals if they show any signs of stress.